SPECTATOR SATISFACTION IN PROFESSIONAL SPORT: A TEST OF A HIERARCHICAL MODEL

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Consistently maintaining attendance at sporting events is particularly difficult, as aspects of quality, such as atmosphere and game quality, are unable to be controlled (Kennett, Sneath, & Henson, 2001). Therefore, it is strategically important to understand and manage spectator perceptions of service quality, and to understand how these perceptions affect value, satisfaction and behavioural intentions. Despite this, research into spectators' perceptions of service quality dimensions, and the related services constructs is scarce. The current study addresses this deficiency by identifying spectators' perceptions of service quality for Super 12 rugby, and the effect that these have on value, satisfaction and behavioural intentions.

The findings of the study are based on the analysis of a sample of 462 respondents who attended a Super 12 rugby match in Christchurch, New Zealand. Eleven subdimensions of service quality, as perceived by spectators of Super 12 rugby, were found. These were: Security Employees, Food and Beverage, Players, Social Factors, Visuals and Sound, Access, Seats, Cleanliness, Atmosphere, Game Quality, and Entertainment. Support for the use of the primary dimensions of Interaction Quality, Physical Environment Quality, and Outcome Quality as broad dimensions of service quality in a hierarchical factor structure for a spectator sport was found. Also, evidence for the hypothesised paths between service quality, value, satisfaction, and behavioural intentions was identified. Fanship also had a significant positive affect on service quality and satisfaction perceptions, and on behavioural intentions. Each of the primary dimensions varied in terms of their importance to overall Perceived Service Quality, as did the subdimensions to the primary dimensions.

The results of the analysis make a contribution to the service marketing theory by providing an empirically based insight into the Service Quality construct. The study also provides a framework for understanding the effects of the three primary dimensions on Service Quality, and how that affects the service constructs of Value, Satisfaction, and behavioural intentions. Also, Fanship was identified as an important predictor variable for numerous constructs, especially behavioural intentions.

This study will assist sports marketers and practitioners to develop and implement services marketing strategies in order to achieve a high quality of service and enhance spectator satisfaction, value, and favourable behavioural intentions.

Key Words: Services marketing, service quality, service quality dimensions, satisfaction, value, spectator perceptions, rugby union, Super 12.

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Chapter 1: Introduction

1.1 Problem Setting

Most of the research to date in sports marketing has been conducted in the areas of kinesiology, physical education and recreation, sociology, and psychology (Shannon, 1999). However, Kennett, Sneath, and Henson (2001) pointed out that one of the major tasks facing sports marketers was how to maintain interest in, and attendance at, sporting events as there are many variables which they cannot control. It has been thought to be strategically important to manage the variables that sports marketers can control. This strategic direction is necessary in order to ensure that fans have positive experiences, even when games are not exciting and the home team does not win (Kelly & Turley, 2001; Theodorakis, Kambitsis, Laios, & Koustelios, 2001).

According to Kelly and Turley (2001), team management and player performances tend to dominate the technical quality dimension[1], thus little influence can be exerted in sports service encounters over this important dimension of service quality. Theodorakis et al. (2001) termed this uncontrollable dimension the sport core product. It features all aspects related to the actual playing of the game - such as players' performance, star participation, recruiting, and trading players.

In contrast to technical quality, Kelly and Turley (2001) suggested that sports marketers were able to exert considerably more control over the functional quality dimension[2]. Theodorakis et al. (2001) considered the functional quality dimension as an extension to the core product, and included ticketing, food and beverage, parking, courteous employees, comfortable seats, modern and clean facilities, half time entertainment, and hospitality to sponsors and media.

Understanding which dimensions or extensions spectators perceived as important was therefore seen as vitally important to the sports marketer (Kelly & Turley, 2001; Theodorakis et al., 2001). As Wheatley, Chiu, and Goldman (1981) suggested, dimensions or cues that are not perceived as important, cannot influence the consumer decision processes.

[1] Gronroos (1984) defined technical quality as *what* the customer received in a service encounter.
[2] Gronroos (1984) defined functional quality as *how* the service was delivered. See Chapter Two, Section 2.4.1 for further clarification.

1.2 Rugby Union in New Zealand

Rugby union has the largest market share of any professional sport in New Zealand (Bullen, 2004), occupying a place in New Zealand's sporting psyche similar to that generated in the UK by Premier League Soccer, or in the US by American Football. The national team, the 'All Blacks' are well renowned internationally and have a long history as one of the best teams competing in international tournaments.

Rugby Union bears similarities to team sports such as rugby league and American football, and is played in over 100 countries worldwide. As of 2000, there were 92 official Unions making up the International Rugby Board (IRB)[3]. The traditional powerhouses of rugby union in terms of spectator attendance, numbers of people playing the game, and international success on the field are England, Ireland, Scotland, Wales, France, South Africa, New Zealand and Australia (http://www.planetrugby.com).

Rugby Union was described by Owen and Weatherston (2002a) as follows:

> Rugby Union is an extremely physical, contact sport played between two teams each consisting of 15 players (with substitutions allowed), using an oval shaped ball. Matches are made up of two halves of 40 minutes each and take place on a rectangular field, with maximum dimensions of 100m × 70m plus up to 22m in each 'in-goal' area. The aim of the game is to accumulate more points than the opposing team by scoring tries (presently worth five points) and by kicking conversions (two points), penalties (three points) and drop goals (three points)[4]. A try is scored if a player crosses the opposing team's line by running with the ball in hand, kicking the ball, and passing the ball (but not forwards) to another player in the team (p.2).

In addition to international games, spectators in New Zealand can expect to watch matches played in the National Provincial Championship (NPC)[5], the Tri-Nations (which features South Africa, Australia and New Zealand), and the Super 12.

[3] The world governing body for rugby union.
[4] The rules of the game are available at URL: http://www.irb.com/laws_regs/laws/index.cfm.
[5] There are currently 27 provincial unions involved in the NPC. Ten teams in the First Division, Eight teams in the Second Division, and nine teams in the Third Division (Owen & Weatherston, 2002a).

The Super 12 rugby union competition was initiated after the 1995 Rugby Union World Cup, as part of the new era of professionalism. Owen and Weatherston (2002b) described the Super 12 competition:

> It is a provincial tournament held annually, since 1996, between 12 teams (three from Australia, four from South Africa and five from New Zealand) over 13 weeks, generally starting in late February and concluding in late May. The Super 12 competition is organised through the award of franchises by SANZAR, which is made up of the three national organising bodies (the Australian Rugby Union, the NZRFU[6] and the South African Rugby Football Union), backed by the broadcaster News Corporation. A franchise effectively guarantees a team a regional monopoly[7]. Each New Zealand-based franchise has associated with it a 'brand': the Blues, the Chiefs, the Crusaders, the Hurricanes, and the Highlanders (p.4).

The Super 12 has proved to be financially successful for each of the New Zealand based franchises. Host communities can also benefit as it provides opportunities for other tourism-related activities (Ritchie, Mosedale, & King, 2002). During interviews with rugby administrators, Higham and Hinch (2003) found that the Super 12 had extended the distance that spectators were willing to travel to a match in the Highlanders' region. Also, because of modifications made to the game, new spectator markets for rugby were reported (Higham & Hinch, 2003). In a survey of tourist rugby spectators for the ACT Brumbies Super 12 team, Ritchie et al. (2002) found that the sample spent $A343 on average, therefore benefiting the host region. This was in addition to the expenditure made by those attending the match from the host region. Thus, if the quality of the service is not well managed, there are substantial negative financial consequences for both the sport of rugby, and the host region.

[6] New Zealand Rugby Football Union.
[7] Owen & Weatherston (2002a) described this monopoly as being similar to the territorial monopoly granted to team owners of franchises in North American baseball.

1.3 Purpose of the Research

Owen and Weatherston (2002b) investigated the determinants of attendance at New Zealand rugby union matches in the Super 12 competition, with emphasis on examining the effects of pre-match uncertainty of outcome[8]. This research relied on indirect measures, and did not attempt to capture spectators' perceptions directly. However, despite the increasingly complex arena of rugby union in New Zealand, no empirical research into spectators' perceptions of quality, and how quality relates to satisfaction, value and future intentions has been conducted.

The purpose of this research is to gain an empirically based insight into spectators' perceptions of service quality in professional rugby union. In particular, this research will identify the dimensions of service quality as perceived by spectators of the Super 12 competition.

In addition, this research will determine the effects of service quality on related constructs such as satisfaction, value, and future intentions. The effects of fanship (enduring involvement) on these constructs will also be analysed. Finally, the least and most important service quality dimensions will be determined.

This research will adopt a hierarchical structure to service quality, developed by Brady and Cronin (2001). The research has four main objectives;

(i) To identify the dimensions of service quality for a professional sport in New Zealand as perceived by spectators.

(ii) To determine the effects of service quality on the related constructs of satisfaction, value, and future intentions.

(iii) To identify the effects of fanship (enduring involvement) on service quality, satisfaction, and future intentions.

(iv) To identify the least, and most important service quality dimensions as perceived by spectators of a professional sport in New Zealand.

[8] Attendance was theorised to be a function of several potential economic and sporting factors: match specific factors reflecting the environment (such as temperature and rain), the entertainment value, characteristics of the opposition, player characteristics, recent success, seasonal uncertainty and match uncertainty. Price was not included in the model as there was little variation across the venues and across time in which the data were collected (Owen & Weatherston, 2002b).

1.4 Contribution of the Research

By satisfying these objectives this study will contribute to the marketing literature from both an academic and practical perspective. First, this study contributes to the marketing literature by providing an examination of several service constructs. This is an important contribution as it provides a better understanding of spectator perceptions of service quality, satisfaction, value, and future intentions, as well as fanship.

Second, marketers and practitioners in the professional sporting sector will benefit from the research findings as they will provide practical information about what spectators consider important in their evaluation of service quality, and the effect that this has on other important constructs. This understanding will provide marketers and practitioners with an opportunity to develop and implement services marketing strategies to ensure a high quality of service, which could enhance spectator satisfaction, and therefore increase favourable intentions.

1.5 Thesis Overview

This study consists of six chapters in order to meet the Research Objectives outlined in Section 1.3.

Chapter Two reviews the service quality literature, and the literature of related constructs of satisfaction, value, favourable intentions, and involvement. Chapter Three presents the conceptual model based on the findings of the literature review in Chapter Two, and develops 13 testable hypotheses, which will satisfy Research Objectives 1, 2, 3, and 4. Chapter Four details the methodology used to test the hypotheses. Chapter Five presents and discusses the results of the analysis undertaken in this study. Finally, Chapter 6 offers conclusions and recommendations based on the results and discussion presented in Chapter Five.

Chapter 2: Literature Review

2.1 Chapter Introduction

This chapter examines the relevant literature regarding the conceptualisation and measurement of service quality, and the relationship of service quality to related constructs such as satisfaction, value and favourable behavioural outcomes. It also presents an overview of the literature specific to service quality in the sports and recreation industry.

Outlined are the major changes in the conceptualisation and measurement of service quality that have primarily occurred as a result of the large amount of discussion and debate surrounding the SERVQUAL measurement scale (Parasuraman, Berry, & Zeithaml, 1991; Parasuraman, Zeithaml, & Berry, 1988, 1994).

The characteristics of services that are distinct to the marketing of sporting events for spectators are discussed. In particular, the little influence that can be exerted over the core product – the game (Kelly & Turley, 2001). In addition, particular attention is paid to those service quality dimensions that are under the direct control of sports marketers. Fanship, a construct unique to the marketing of sports events to spectators is introduced. The definitions and causal directions of the service quality, satisfaction and value constructs are presented.

2.2 Services Marketing

The services marketing discipline started to gain acceptance within the marketing literature following a broadening of the definition of a "product" to include services (Kotler & Levy, 1969). Gronroos (1978) found that the early marketing researchers based most of their examples on goods industries. Regan (1963) recognised that comprehension of services was difficult due to their distinct characteristics. Rathmell (1966) further distinguished goods from services and described 13 distinct characteristics. Wyckham, Fitzroy, and Mandry (1975) questioned the necessity of distinguishing between services and goods, and claimed that the characteristics did not impact on services as the literature had suggested. However, subsequent literature recognised that there are five characteristics of services that differentiate them from goods (Clemes, Mollenkopf, & Burn, 2000). Clemes et al. (2000) summarised them as: intangibility, inseparability, heterogeneity, perishability and lack of ownership. Carman

(1990) concluded that many of the difficulties conceptualising and measuring service quality was the result of these characteristics.

Gronroos (1978) also recognised that services could not be treated like goods in a marketing planning context and called for a new marketing mix concept. Even though much of the early services marketing literature and academic research centred on issues such as; "How do services differ from goods?" (Lovelock, 1983, p.19) and creating new strategies for marketing services (Gronroos, 1978), Mels, Boshoff, and Nel (1997) have described the development of the academic field of services marketing since the 1970s as spectacular.

2.3 An Overview of Service Quality

General interest in quality management in the service sector has been estimated to have started sixty years later than in the goods sector (Gummesson, 1991). The product quality and customer satisfaction literature therefore form the foundation of early service quality theory (Brady & Cronin, 2001; Parasuraman, Zeithaml, & Berry, 1985).

Gronroos (1978) cautioned that service firms needed to manage the process of transforming services into concrete offerings to prevent customers from picking out quality attributes, unguided, that formed the service in the customers' mind. This phenomena has been evident in the goods quality literature, with consumers using cues to form impressions of quality, even when they have little or no relationship to actual quality (Jacoby, Olson, & Haddock, 1971).

Similarly, Gilmour (1977) found that purchasing behaviour was related more to perceived product or service characteristics than to actual performance characteristics when respondents were asked to list all the factors they considered before making a decision to use a particular service. As the service only exists during the time in which it is rendered, Shostack (1977) found the reality of services to consumers was defined experientially, rather than in engineering terms. Performance dimensions have similarly been described as a property of human experience and thought (Swan & Combs, 1976). Gummesson (1991) described the problem:

> "It is rather a matter of creating a deeper insight into the many dimensions that form a fuzzy entity that, through social consensus, is referred to as quality". (p.3)

Further confusion surrounded the term "quality" as it was frequently used as if it were the variable itself, and not a function of a range of resources and activities (Gronroos, 1984). Parasuraman et al. (1988) defined perceived service quality as a form of attitude, related but not equivalent to satisfaction, resulting from a comparison of expectations with perceptions of performance. Carman (1990) interpreted this to mean service quality was an enduring, global attitude, while satisfaction was related to a specific transaction. The author went on to caution that calling quality an attitude was not a common practice among researchers (Carman, 1990). Cronin and Taylor (1992) agreed that a review of the literature and the empirical results of several studies suggested that service quality should be conceptualised and measured as an attitude. Understandably, service quality has been described as an elusive and indistinct construct (Parasuraman et al., 1985).

Three underlying themes from the service quality literature were identified by Parasuraman et al. (1985):

- Service quality is more difficult for the consumer to evaluate than goods quality.
- Service quality perceptions result from a comparison of consumer expectations with actual service performance.
- Quality evaluations are not made solely on the outcome of a service; they also involve evaluation of the process of service delivery (p.42).

The complexity in measuring and conceptualising service quality led Brady and Cronin (2001) to deem it the "most debated and controversial topic in the services marketing literature to date" (p.34).

However, Rust and Oliver (1994) suggested that service quality was seen to be increasingly important in both the product and service sector. Smith (1995) also stated that customer care and service quality programmes were reliant on the identification of customers' evaluation of the quality of service[9]. Therefore, effectively managing service quality required a clear understanding of how service quality was perceived by a customer (Lehtinen & Lehtinen, 1991; Rust & Oliver, 1994).

2.4 Conceptualisations of Service Quality

In order to provide a clear understanding of service quality, researchers have attempted to provide a customer perceived model of service quality (Dabholkar, Thorpe, & Rentz,

[9] For example, Kotler and Levy (1969) suggested that customers will form impressions of an organisation from its physical facilities, employees, officers, stationery, and numerous other company surrogates.

1996; Gronroos, 1982; Gronroos, 1984; Lehtinen & Lehtinen, 1991; Parasuraman et al., 1985, 1988). Nonetheless, despite two decades of study and much lively debate, Brady and Cronin (2001) described the conceptual work on service quality as divergent.

Chase and Bowen (1991) considered that there were three alternative conceptualisations of service quality presented in the literature by academics. These were the attribute theory, the customer satisfaction theory, and the interaction theory. The attribute theory assumes that service quality primarily reflects the attributes of the service delivery system and essentially applies the product quality framework to services. The customer satisfaction theory approach treats service quality as a perceptual phenomenon identified through the eyes of the customer. The meaning, definition, and evaluation of quality exist in the consumer's mind. Ultimate quality was described as the difference between service quality expectations and the perceptions of reality. The interaction theory approach to service quality emerged through the mutual need satisfaction of both employees and customers (Chase & Bowen, 1991).

Alternatively, Brady and Cronin (2001) suggested that researchers have generally adopted one of two conceptualisations of service quality. Firstly, the "Nordic" perspective (Gronroos, 1982; Gronroos, 1984), which defines service quality in terms of two dimensions: functional and technical quality. Secondly, the "American" perspective (Parasuraman et al., 1988), which uses terms (i.e., reliability, responsiveness, empathy, assurances, and tangibles) that describe service encounter characteristics. The Nordic school defines service quality using overall categorical terms, whereas the American school uses descriptive terms. While the "American" perspective dominates the literature, both perspectives are thought to highlight important aspects of service quality, with neither fully capturing the construct (Brady & Cronin, 2001).

A more detailed description of the "Nordic" conceptualisation (Section 2.4.1) and the "American" conceptualisation (Section 2.4.2) follows.

2.4.1 The Perceived Service Quality Model

In an attempt to understand these customer perceptions of service quality more comprehensively, Gronroos (1984) developed a perceived service quality model.

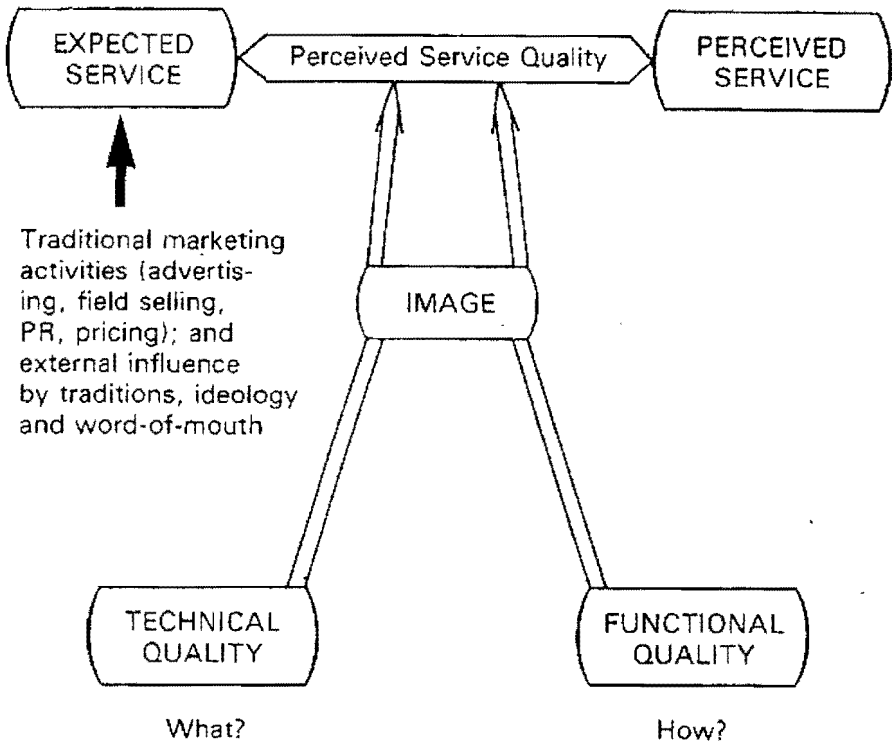

Figure 2-1: Gronroos's Service Quality Model (Gronroos, 1984)

Perceived quality of a given service was judged to be the outcome of an evaluation process, where the consumer compared the expected service to the perceived service to form perceived service quality (Gronroos, 1984).

As well as adopting the disconfirmation paradigm[10] for the measurement of service quality, Gronroos (1984) proposed that perceived service quality was a result of two service dimensions, technical quality and functional quality. Technical quality was defined as the outcome of the production process or what the customer receives in a service encounter. Functional quality corresponded to how the service was delivered, or the expressive performance of a service (Gronroos, 1984).

2.4.2 The Gap Model

Parasuraman et al. (1985) researched the determinants of service quality and found that regardless of the type of service, consumers used similar criteria in evaluating service quality. Similar to the perceived service quality model (Gronroos, 1984), the quality that

[10] Cadotte, Woodruff, and Jenkins (1987) described the confirmation/disconfirmation paradigm as being widely accepted as the process by which consumers developed feelings of satisfaction or dissatisfaction. Swan and Trawick (1981) concluded that confirmation/disconfirmation involved an anticipation of how well a product or service would perform on attributes of importance. The formation of expectations was considered by Madrigal (1995) to be especially relevant in the context of competitive sporting events, as fans often had a general idea of who was expected to win even though the event outcome was rarely known prior to a competition.

a consumer perceives was still regarded as a function of the magnitude and direction of the gap between the expected service, and the perceived service (Parasuraman et al., 1985). However, rather than the two dimensions of service quality described by Gronroos (1984), ten dimensions were found and purported to transcend different types of services and to be applicable across a broad spectrum of services (Parasuraman et al., 1985). Many of the dimensions identified were considered to be 'experience properties'.

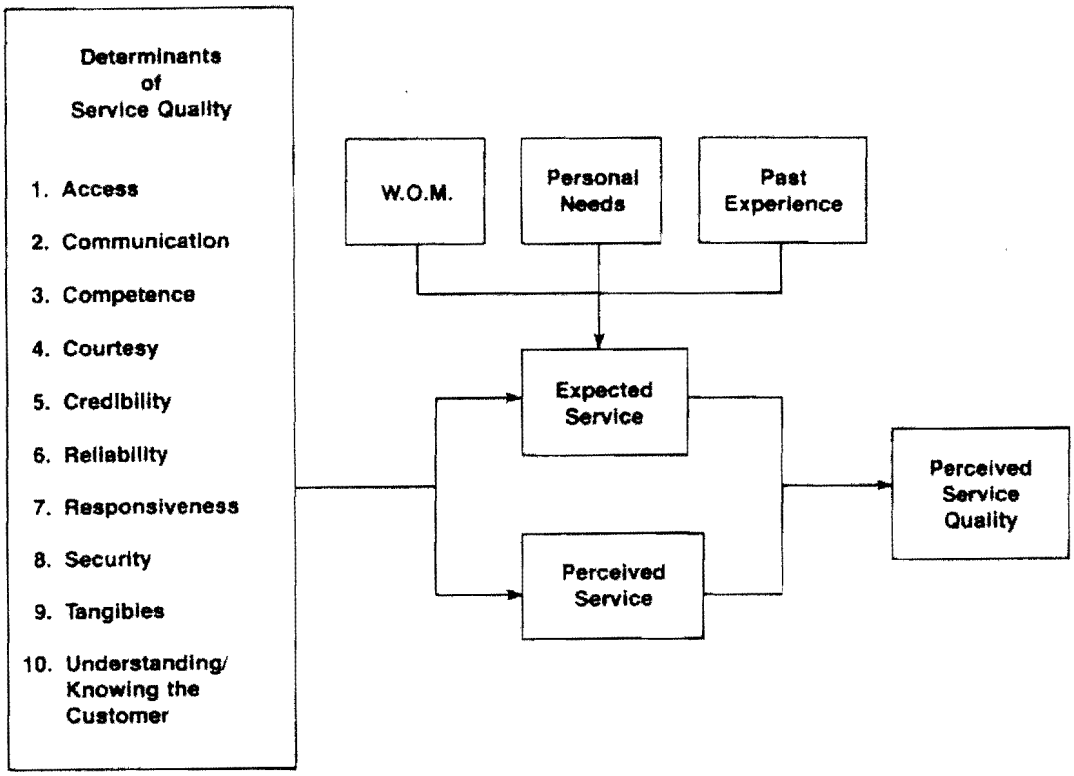

Figure 2-2: Determinants of Perceived Service Quality (Parasuraman et al., 1985)

Following these early conceptualisations of service quality, researchers turned their attention to the measurement of service quality (Cronin & Taylor, 1992, 1994; Parasuraman et al., 1988, 1994).

2.5 Measuring Service Quality

During the 1980's, much of the research concentrated on developing a model of service quality so that practitioners could further understand and conceptualise customer perceptions (Gronroos, 1984; Parasuraman et al., 1985). One of the most noted measurement methods based on the disconfirmation paradigm was developed by Parasuraman et al. (1988), the SERVQUAL scale.

2.5.1 SERVQUAL Scale

Parasuraman et al. (1988) used their 1985 study as a basis to develop a multiple item scale called SERVQUAL for measuring service quality. The ten dimensions originally identified by Parasuraman et al. (1985) were reduced to five, which were proposed to capture facets of the original ten. These were:

> *Tangibles*: Physical facilities, equipment, and appearance of personnel.
>
> *Reliability*: Ability to perform the promised service dependably and accurately.
>
> *Responsiveness*: Willingness to help customers and provide prompt service.
>
> *Assurance*: Knowledge and courtesy of employees and their ability to inspire trust and confidence.
>
> *Empathy*: Caring, individualised attention the firm provides its customers (p.23).

SERVQUAL was based on these dimensions and was purported to be applicable across a broad spectrum of services as a concise multiple-item scale with good reliability and validity. It was thought to be able to be used to better understand the disconfirmation of expectations and perceptions of consumers and, as a result, improve service quality. However, the authors noted that SERVQUAL provided only a basic skeleton, and that it may need to be adapted or supplemented to fit individual situations (Parasuraman et al., 1988).

Parasuraman et al. (1988) maintained that perceived service quality should be measured as the degree and direction of discrepancy between consumers' perceptions and expectations, in accordance with the conceptual models of service quality described in the previous two sections (Gronroos, 1984; Parasuraman et al., 1985).

2.5.1.1 Problems with the SERVQUAL Instrument

Few research areas within the services marketing literature have attracted as much attention as SERVQUAL (Mels et al., 1997). Smith (1995) suggested that this may be due to the extravagance of the claims made in regard to its practical applications, and the apparent simplicity of the solution to capture the disconfirmation paradigm.

Van Dyke et al. (1997) grouped the problems cited in the literature into two categories: conceptual and empirical.

> The conceptual problems centre around (1) the use of two separate instruments, one for each of two constructs (i.e. perceptions and expectations), to

operationalise a third conceptually distinct construct (i.e. perceived service quality) that is itself the result of a complex psychological process; (2) the ambiguity of the expectations construct; and (3) the suitability of using a single instrument to measure service quality across different industries (i.e. content validity) (p.196).

Many of the empirical problems were thought to be the result of the conceptual problems identified by Van Dyke et al. (1997). The authors argued that the most notable of these were the use of difference scores[11], and the stability of the SERVQUAL dimensions[12]. These two problems resulted in low reliability, unstable dimensionality, and poor convergent validity of the instrument.

As a result of the continuing controversy surrounding the conceptual, methodological and interpretive problems with the SERVQUAL scale, Smith (1995) concluded that the instrument was of questionable value to either academics or practitioners. Researchers therefore looked to develop new measurement methods. Two of these, performance measures (Cronin & Taylor, 1992, 1994), and alternative dimensional structures (Brady & Cronin, 2001; Dabholkar et al., 1996), are reviewed.

2.5.2 Performance Measures

Swan and Trawick (1981) argued that the disconfirmation perception involved more than simply comparing perceived performance with expected performance. Similarly, Carman (1990) suggested that analysing expectations and perceptions in one administration, as opposed to before and after the service encounter, meant that respondents beliefs on their expectations could be influenced by their experiences. Also, where the expectations battery was used prior to the service encounter, the results were not satisfactory[13]. The researcher concluded that while understanding expectations was important to service providers, the difference between expectation and perception should not form part of a researcher's analysis (Carman, 1990). Teas (1993) also found that a considerable portion of the variance in the SERVQUAL expectations measures was caused by respondents' misinterpretations of the questions, rather than to different attitudes or perceptions.

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[11] For example see Cronin and Taylor (1992; 1994), and Brown, Churchill, and Peter (1993).
[12] Discussed in Section 2.5.3.
[13] Carman (1990) suggested that the unsatisfactory results arose because respondents expectations were not based on experience, and their subsequent assessment of quality after the service encounter were based on knowledge.

In relation to the disconfirmation of expectations and experiences for satisfaction, Oliver (1981) recommended the most meaningful approach from the respondent's standpoint was a direct measure of the disconfirmation process in a better or worse than expected scale.

Alternative measurement methods were therefore suggested. One of the most noted was developed by Cronin and Taylor (1992), the SERVPERF Scale.

2.5.2.1 SERVPERF Scale

SERVPERF, a performance-based approach to the measurement of service quality, was introduced as an alternative to the disconfirmation process used in SERVQUAL (Cronin & Taylor, 1992). The SERVPERF measure was based on consumers' perceptions of the performance of a service provider only, as opposed to the difference (or gap) between the consumers' performance perceptions and their performance expectations (Brady, Cronin, & Brand, 2002). Cronin and Taylor (1994) theoretically supported this measurement scale because process constructs (such as disconfirmation and consumer satisfaction judgements) relied on the consumer experiencing a service encounter. However, as performance perceptions were not constrained to actual consumer experiences, they were thought to be superior measure than disconfirmation measures (Cronin & Taylor, 1994).

Parasuraman et al. (1994) argued that measuring expectations was an effective tool for practitioners, and that the superior diagnostic value of SERVQUAL more than offset the loss in predictive power using regression analysis. However, Zeithaml, Berry, and Parasuraman (1996) later conceded that the perceptions only operationalisation was more appropriate if the primary purpose of research was an attempt to explain the variance in a dependent construct. As a result, service quality measurements that do not include the expectation battery have dominated the recent literature (Brady & Cronin, 2001; Theodorakis et al., 2001).

2.5.3 Service Quality Dimensions

Much doubt has been raised as to whether the SERVQUAL items and scale are generic to all industries, as the majority of researchers have consistently failed to identify SERVQUAL's five underlying dimensions (Brown et al., 1993; Carman, 1990; Smith, 1995; Taylor, Sharland, Cronin, & Bullard, 1993). Brown et al. (1993) also questioned whether a scale used to measure service quality could be universally applicable to all

industries, as many items were missing that they considered critical to subjects' evaluation of the quality of service. In addition, the SERVPERF scale was confirmed by Cronin and Taylor (1994) to have exhibited the same dimensional instability across service industries inherent in the SERVQUAL difference scores.

Cronin and Taylor (1994) advised marketers to confirm the hypothesised five-factor structure specific to their individual research setting[14]. Taylor, Sharland, Cronin, and Bullard (1993) had also recommended that researchers and practitioners confirmed the factor structure of the service quality data to ascertain how many dimensions were implicit in their own particular sample relative to their specific industry.

Rust, Zahorik, and Keiningham (1996) also suggested that the differences in dimensions were related to the profound differences in service scenarios, as they involved different wants and needs and did not fit into broad categories. In addition, Ueltschy and Krampf (2001) empirically found that customer satisfaction scales and service quality measures were culturally sensitive. They recommended the examination of existing satisfaction and service quality scales in relation to the market segment or target market under investigation (Ueltschy & Krampf, 2001). Similarly, Theodorakis et al. (2001) suggested that the relative importance of service-quality dimensions in professional sports, and their ability to explain spectators' satisfaction may vary in different countries.

Despite these revelations, Parasuraman et al. (1991) defended the dimensional structure of SERVQUAL as capturing summary criteria that customers used in assessing service quality. They contended that the differences in the number of empirically derived factors across replications were a result of across-dimensions similarities and/or within-dimension differences in customers' evaluations of a specific company involved in each research setting.

However, there was increasing support for the view that the dimensionality of the service quality construct was dependent on the service industry under investigation (Burton, Easingwood, & Murphy, 2001; Kim & Kim, 1995). Researchers recommended that future studies on service quality should involve the development of industry-specific measures (Dabholkar et al., 1996; Powpaka, 1996).

[14] Brady and Cronin (2001) concluded that the theoretical concern with the dimensions of the SERVQUAL model should be what was reliable, responsive, empathetic, assured, and tangible in order to achieve service excellence.

2.5.4 Hierarchical Models of Service Quality

As the complexity of the service quality construct and its dimensions became apparent, researchers began to focus on the levels of evaluation that customers perceived (Brady & Cronin, 2001; Dabholkar et al., 1996). Perceptions of quality were increasingly thought to occur at multiple levels in a service organisation setting, with consumers' distinguishing between the quality of the interaction with the service provider, the quality of the core service, and the overall quality of the organisation (Bitner & Hubbert, 1994). Similarly, Carman (1990) found that when one of the dimensions of quality was of particular importance to a customer, they were likely to break down that dimension into subdimensions. Furthermore, Lehtinen and Lehtinen (1991) determined that while similar dimensions were found for service quality they were based on different aspects of the each dimension from the customer's perspective. In light of these findings, the first hierarchical model of service quality was proposed and tested by Dabholkar et al. (1996) in the retail service sector.

2.5.4.1 Hierarchical Retail Service Quality Model

In order to develop and validate a scale to measure retail service quality, Dabholkar et al. (1996) further investigated the dimensions of service quality in the retail environment based on the previous retail literature and an analysis of previous service quality studies. A hierarchical factor structure was developed. The rationale for the higher order factor structure was that it best explained the high intercorrelations among items across factors, and the single factor structures found in previous studies in which SERVQUAL was not supported (Dabholkar et al., 1996).

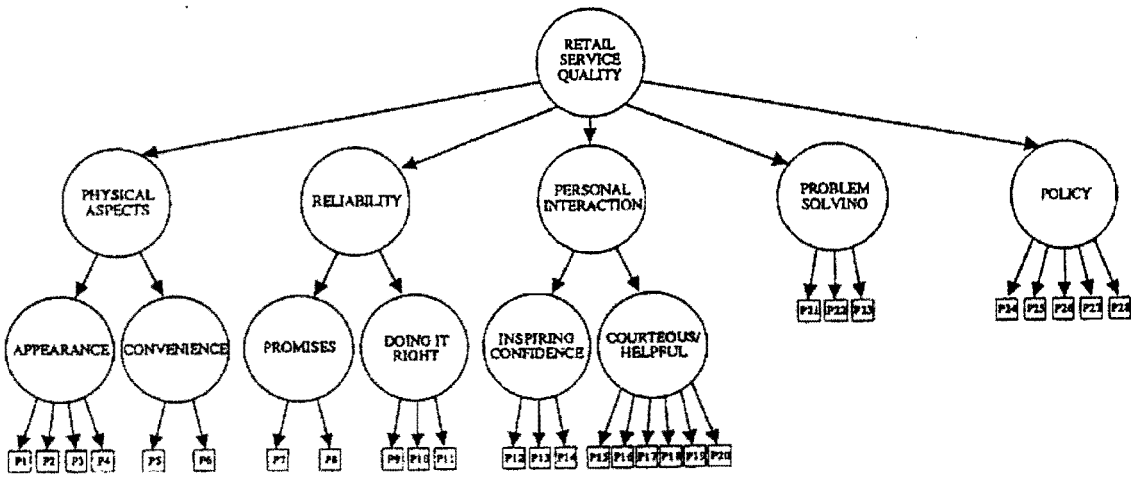

Figure 2-3: Hierarchical Structure for Retail Service Quality (Dabholkar et al., 1996)

The second-order factor structure for retail service quality was well supported by the data. Within the hierarchical structure, customers were proposed to form evaluations of retail quality at three different levels - an overall level, a dimensional level, and a subdimensional level. Customers were therefore thought to evaluate retail service quality on the five basic dimensions (see figure 2-3 above) and view overall retail service quality as a higher order factor that captured a meaning common to all dimensions (Dabholkar et al., 1996).

2.5.4.2 Integrated Hierarchical Model

In an attempt to integrate the differing conceptualisations of service quality and to unify the abundance of theory on service quality, Brady and Cronin (2001) developed and tested an integrated hierarchical conceptualisation. Their review of the literature revealed that service quality was most often defined by either or all of a customer's perception regarding; (1) an organisation's technical and functional quality, (2) the service product, service delivery, and service environment, or (3) the reliability, responsiveness, empathy, assurances, and tangibles associated with a service experience. Therefore, these seemingly conflicting perspectives advanced in the literature were combined to reflect the complexity and the hierarchical nature of the service quality construct (Brady & Cronin, 2001).

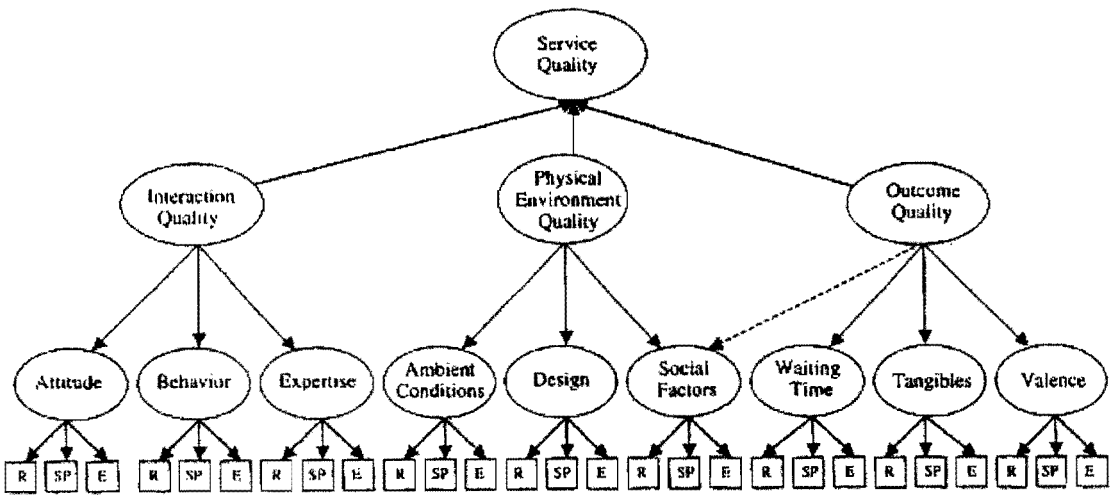

Figure 2-4: Integrated Hierarchical Model (Brady & Cronin, 2001)

Brady and Cronin's (2001) model lists three primary dimensions (interaction quality, physical environment quality, and outcome quality) with each having three subdimensions. Customers were expected to aggregate their evaluations of the subdimensions to form their perceptions of an organisation's performance on each of the

three primary dimensions. Those perceptions then led to an overall service quality perception (Brady & Cronin, 2001).

In order to achieve a conceptualisation that recognised the significance of the SERVQUAL factors, but that identified the attributes that influence service quality perceptions, the reliability, responsiveness, and empathy variables were repositioned as descriptors or modifiers of the nine subdimensions. As customers were expected to use tangibles as a proxy for evaluating service outcomes, this was included as a subdimension of outcome quality. The assurance dimension was left out of the model as it did not remain distinct in factor analysis. All of the paths were statistically confirmed, indicating that each subdimension was appropriately conceived as an aspect of service quality (Brady & Cronin, 2001).

In addition to the service quality studies mentioned above, there have also been several service quality studies for sport and recreation. These are explored in Section 2.6.

2.6 Service Quality Studies for Sport and Recreation

A study based on four recreational settings (health clubs, golf courses, movie theatres and dog tracks) revealed that the SERVQUAL dimensions were inadequate in capturing the service quality construct (Taylor et al., 1993). Attempts were subsequently made by McDonald, Sutton, and Milne (1995) to modify the SERVQUAL model to make it specific to the sports industry through the development of the TEAMQUAL scale. The modifications involved measuring expectations and perceptions at the same time, and measuring multiple service encounters rather than one single encounter (McDonald et al., 1995). However, the original SERVQUAL dimensions were accepted and used in the TEAMQUAL scale.

In contrast to the stable dimensional structure of SERVQUAL and TEAMQUAL, other dimensional studies in recreation have displayed quite diverse dimensional structures (Kelly & Turley, 2001; Kim & Kim, 1995). For example, an empirical study on Korean Sport Centres found the following twelve dimensions of service quality; ambiance, employee attitude, reliability, information giving, programming, personal consideration, price, exclusivity, ease of mind, convenience, stimulation, and social opportunity (Kim & Kim, 1995). Kelly and Turley (2001) empirically factored 35 attributes into nine distinct dimensions of service quality for sporting events; employees, price, facility access, concessions, fan comfort, game experience, showtime, convenience, and smoking.

Service quality in professional sports has also been measured using SPORTSERV, which was based on five dimensions; access, reliability, responsiveness, tangibles and security (Theodorakis & Kambitsis, 1998, cited in Theodorakis et al., 2001).

The use of broad categories in the measurement of service quality, such as the technical and functional dimensions suggested by Gronroos (1982; 1984), and the service product, service environment, and service delivery suggested by and Rust and Oliver (1994) have been identified empirically as the primary dimensions; interaction quality, physical environment quality, and outcome quality by Brady and Cronin (2001). Therefore, these will be further explored in a Sport and Recreation context in Sections 2.6.1, 2.6.2 and 2.6.3.

2.6.1 Interaction Quality

Hartline and Ferrell (1996) argued that the employee-customer interface was the most important determinant of customers' perceptions of service quality. Further, Bitner, Booms, and Mohr (1994) suggested that the service encounter or "moment of truth" when the customer interacted with the firm, offered the most immediate evidence of a service from the customer's point of view. Two major conclusions from previous research in this area were presented by Hartline and Ferrell (1996):

> (1) Managers can influence customer-contact employees' responses so as to enhance service quality, and (2) the responses of customer-contact employees heavily influence customers' perceptions of service quality and the service encounter (p.52).

Brady and Cronin (2001) also found strong support in the literature for the inclusion of an interaction dimension in their hierarchical model.

Bitner et al. (1994) found that having a true customer orientation for frontline employees was negatively affected by inadequate or poorly designed systems, poor or nonexistent recovery strategies, or a lack of knowledge. Hartline and Ferrell (1996) established that the primary determinants of customers' perceptions of service quality were the attitudinal and behavioural responses of customer-contact employees. Brady and Cronin (2001) empirically found employee attitudes, expertise, and behaviours to have constituted customer perceptions of interaction quality.

Of the twelve distinct dimensions for service quality found for sports centres (Kim & Kim, 1995), at least 4 could be considered to be interaction quality dimensions. These

were employee attitude, reliability, information giving, programming and personal consideration. Kelly and Turley (2001) also determined empirically that employees formed one of the nine service quality importance dimensions of service quality in a sport and recreation context.

2.6.2 Physical Environment Quality

Bitner (1992) suggested that because services are generally produced and consumed simultaneously, and the consumer was "in the factory," the firm's physical facility would have a strong impact on customers' perceptions of the service experience. Further, Turley and Fugate (1992) argued that when there was close interaction between the service facility and the customer, it would be viewed as the service. Wakefield and Blodgett (1999) postulated that because intangible aspects of service quality were subject to employee heterogeneity and inconsistency, an attractively designed physical environment could more consistently generate a positive influence on consumers' overall perceptions of service quality.

Hightower, Brady, and Baker (2002) suggested that fans who were less knowledgeable about the actual sporting event itself, would regard peripheral aspects, such as the environment in which the event was held, as particularly important. In addition to providing tangible cues to the overall service experience, Underwood, Bond, and Baer (2001) argued that the physical facility was instrumental in creating a service identity.

Wakefield and Blodgett (1996; 1999) regarded the physical environment as being particularly important to customer perceptions of service quality when the service was consumed primarily for hedonic purposes rather than utilitarian reasons and the customers spent moderate to long periods of time in the servicescape[15].

While investigating situations where the service facility rather than the service provider may be perceived by consumers as "the service", Turley & Fugate (1992) determined that service facilities had a multidimensionality, unlike most product marketing. They concluded that service facilities had at least five dimensions; the operational perspective, the locational perspective, the atmospheric and image perspective, the consumer's perspective, and the contact personnel's perspective. Rust and Oliver (1994) also found that numerous dimensions were apparent in the service environment and classified them into two main themes; the internal environment (the service provider) and the external (physical) environment.

Turley and Fugate (1992) argued that integrating these often competing perspectives led to favourable judgements of the service environment. However, Bitner (1992) concluded that designing optimal environments to enhance individual approach behaviours and encourage appropriate social interactions was difficult. For example, Bitner (1992) suggested that personality traits, such as arousal seeking, could influence a person's reaction to his or her physical surroundings. Arousal seekers may enjoy and look for high levels of stimulation, whereas arousal avoiders may prefer lower levels of stimulation.

Based on a review of diverse literatures, Bitner (1992) identified three composite dimensions as being particularly relevant to the service environment. These were ambient conditions, spatial layout and functionality, and signs, symbols, and artefacts. Customers and employees were expected to perceive the environment holistically, as a composite of these three dimensions with each dimension expected to affect the overall perception independently and /or through its interactions with the other dimensions. Wakefield and Blodgett (1996) recommended not to focus on ambient conditions as a potential dimension of environmental service quality, because it was particularly more difficult to control in some leisure field settings such as open air stadiums.

In addition to being aesthetically appealing, Wakefield and Blodgett (1994) stated that facility design must ensure patrons of the leisure service felt comfortable. Underwood et al. (2001) argued that as well as sporting facilities providing a clean environment with multiple fan amenities and conveniences, they should foster a strong sense of group affiliation and identity.

In examining the effects of layout accessibility, facility aesthetics, electronic equipment, seating comfort, and cleanliness on the perceived quality of the service environment, Wakefield and Blodgett (1996) found that the primary determinant of perceived servicescape quality was the aesthetic appeal of the facility architecture and décor. Empirical research into the service environment at sporting events by Hightower et al. (2002), found the physical environment was an important determinant of consumers' perceptions of service quality and future behaviours. The servicescape was therefore considered to be an important construct to be included in service quality models - especially for more hedonic services such as sports (Hightower et al., 2002).

Hightower et al. (2002) cautioned that despite the facility-based trend seen in the literature regarding leisure consumption, there was insufficient empirical evidence

[15] Bitner (1992) has termed the physical environment the Servicescape.

connecting a venue's servicescape to service constructs such as enduring involvement, perceptions of value, service quality, waiting time, and behavioural intentions, and that further research should take place. Wakefield and Blodgett (1996) also concluded that service quality research, particularly in the case of leisure services, should more thoroughly investigate the service environment.

2.6.3 Outcome Quality

Smith (1995) described the service outcome as being fundamental to the consumer's evaluation of a service. Even so, Brady and Cronin (2001) found that attempts to identify attributes that define outcome quality had been relatively rare in the literature.

Rust and Oliver (1994) defined outcome quality as the service product - the specific features the service had been designed to deliver. Designing outcome quality in a sporting context was described by Burton and Howard (2000) as being particularly difficult as the outcomes were frequently unpredictable and the script unknown. Madrigal (1995) suggested that this was the principal appeal for watching sporting events, as compared to more predictable forms of leisure.

Knowles, Sherony, and Haupert (1992) represented this theory in "the uncertainty of outcome" hypothesis (UOH). The UOH was based on the assumption that fans received more utility from observing contests with an unpredictable outcome. The more evenly team playing abilities were matched, the less certain the game's outcome, and the greater the game's attendance would be. The UOH was found to be a significant determinant of attendance for Major League Baseball in the United States. In addition, it was shown that attendances were maximised when the home team was slightly favoured (Knowles et al., 1992). However, Alchin and Tranby (1995) found that the uncertainty of outcome did not significantly affect the level of attendance for rugby league matches in Australia. They concluded that other factors played a more determining role, such as price, income and market size (Alchin & Tranby, 1995).

Owen and Weatherston (2002b) investigated the determinants of attendance at New Zealand rugby union matches in the Super 12 competition, with an emphasis on examining the effects of pre-match uncertainty of outcome. The uncertainty of outcome hypothesis, as measured in individual-match uncertainty, was not statistically supported. However, quality of the rugby, as measured by the home-team try-scoring records in previous matches, was found to be a positive statistically significant determinant of attendance (Owen & Weatherston, 2002b).

When considering whether a contest was of high quality, Cyrenne (2001) suggested that spectators would evaluate such things as their team winning, a game that had a large number of talented players, or a more closely contested game. Subsequent judgements of the quality of play were then expected to influence the demand for tickets in much the same way that quality considerations influence the demand for any other product (Cyrenne, 2001).

Madrigal (2003) argued that although skill execution was undoubtedly important for a team to accomplish its goals, it was the competitive nature of sporting events that made watching them a compelling form of leisure behaviour. Wakefield and Blodgett (1999) suggested that excitement was often the end goal of consumers watching a sporting event, and concluded that closeness of competition was a very important outcome.

The two most important attributes of service quality for college basketball in the United States empirically identified by Kelly and Turley (2001) were quality of the game and outcome of the game (game experience). They therefore concluded that both critical service quality attributes were not under the control of marketers (Kelly & Turley, 2001). Brady and Cronin (2001) termed this uncontrollable quality factor valence, as it was outside the direct control of service management, yet still influenced perceptions of the service outcome. The customer could therefore have a positive perception of each service quality dimension, but the negative valence of the outcome could ultimately lead to an unfavourable service experience (Brady & Cronin, 2001).

Madrigal (1995) associated outcome quality to the intensity in which fans viewed their association with a team as an important facet of their self identity. High associations were expected to lead to experiences of greater personal joy and individual association with the team when it experienced successful outcomes.

There have also been numerous studies into constructs that are related to service quality. These are explored in the following section.

2.7 Constructs Related to Service Quality

Rust and Oliver (1994) described the interplay between quality, satisfaction, and value as being the most intriguing issue facing service marketers. Smith (1995) argued that the price/quality or value relationship was vital to the consumer's evaluation of a service, and often not addressed in service quality conceptualisations. The interrelationships between service quality and other service constructs was also identified by Brady and Cronin (2001) as an area that required further analysis.

2.7.1 Satisfaction

Cardozo (1965) found satisfaction was a more global concept than simple product evaluation. Satisfaction involved the evaluation of an entire product bundle or offering, and its definition and measurement was complex (Cardozo, 1965). Similarly, Mano and Oliver (1993) argued that satisfaction had many antecedents and was a much more complex "emotion" than previous researchers had suggested.

Oliver (1981) described satisfaction as an evaluation of the surprise inherent in a product acquisition and/or consumption experience.

> In essence, it is the summary psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the consumer's prior feelings about the consumption experience. Moreover, the surprise or excitement of this evaluation is thought to be of finite duration, so that satisfaction soon decays into (but nevertheless greatly affects) one's overall attitude toward purchasing products, particularly with regard to specific retail environments (Oliver, 1981, p.27).

Churchill and Surprenant (1982) conceptually defined satisfaction as "an outcome of purchase and use resulting from the buyer's comparison of the rewards and costs of the purchase in relation to the anticipated consequences" (p.493). Operationally, they described it as being similar to attitude in that it could be assessed as the sum of the satisfactions with the various attributes of a product or service (Churchill & Surprenant, 1982).

Rust and Oliver (1994) considered customer satisfaction to be a summary cognitive and affective reaction to a service incident or long-term service relationship. Satisfaction resulted from experiencing a service quality encounter and comparing that encounter with what was expected which could be measured on an incident-specific or cumulative basis (Rust & Oliver, 1994).

2.7.2 Relationship between Satisfaction and Service Quality

The relationship between satisfaction and service quality has been described as a complex issue, characterised by confusion regarding the distinction between the two constructs, as well as the causal direction of their relationship (Brady et al., 2002; Parasuraman et al., 1994). Parasuraman et al. (1994) concluded that the confusion surrounding the distinction between the two constructs was partly attributed to

practitioners and the popular press using the terms interchangeably, which made theoretical distinctions difficult.

Interpretations of the role of service quality and satisfaction have varied considerably (Brady et al., 2002; Cronin & Taylor, 1992; Parasuraman et al., 1988). Because service quality was defined as an attitude, Parasuraman et al. (1988) confined satisfaction to relate to a specific transaction, meaning perceived service quality was a global judgement, or attitude, relating to the superiority of the service.

Cronin and Taylor (1992) argued against Parasuraman et al.'s (1988) categorisation finding empirical support for the notion that perceived service quality in fact led to satisfaction meaning that service quality was actually an antecedent of consumer satisfaction. They stated that consumer satisfaction seemed to exert a stronger influence on purchase intentions than service quality, and concluded that the strategic emphasis should focus on total customer satisfaction programs. They reasoned that consumers may not buy the highest quality service because of factors such as convenience, price, or availability and that these may enhance satisfaction while not actually affecting consumers' perceptions of service quality (Cronin & Taylor, 1992).

Cronin and Taylor (1994) later conceded that the directionality of the service quality/satisfaction relationship was still in question and that future studies of these relationships should incorporate multi-item measures. They further suggested restricting the domain of service quality to long-term attitudes and consumer satisfaction to transaction-specific judgements. However, Bitner and Hubbert (1994) determined that service encounter satisfaction was quite distinct from overall satisfaction and perceived quality, and concluded that the constructs exhibited independence.

Adding further to the debate about the distinction between service quality and satisfaction, customer satisfaction has also been operationalised as a multi-dimensional construct along the same dimensions that constitute service quality (Sureshchandar, Rajendran, & Anantharaman, 2002). Despite strong correlations between service quality and customer satisfaction in this study, Sureshchandar et al. (2002) determined that the two constructs exhibited independence and concluded that they were different constructs, at least from the customer's point of view.

In addition, a reverse causal relationship has been hypothesised. Rust and Oliver (1994) stated that while quality was only one of many dimensions on which satisfaction was based, satisfaction was also one potential influence on future quality perceptions.

In endeavouring to clarify the specification and nature of the service quality and satisfaction contructs, Brady et al. (2002) found empirical support for the conceptualisation that service quality was an antecedent of the superordinate satisfaction construct. In addition, satisfaction was found to explain a greater portion of the variance in consumers' purchase intentions than service quality (Brady et al., 2002).

In a sporting context, Theodorakis et al. (2001) determined that through manipulating the service quality dimensions identified as being under their total control, sport marketers could positively influence the satisfaction of customers. Madrigal (1995) argued that satisfaction with the decision to attend an event was related to the post-game affect, the pre-game expectations regarding a team's performance, identification with the team, and the quality of the opponent.

2.7.3 Service Quality, Value and Satisfaction

Kotler (1972) described the core concept of marketing as a transaction in which there was an exchange of values between two parties. Smith (1995) suggested that the price/quality or value relationship was critical to the consumer's evaluation of a service.

Similarly, Edvardsson and Gustavsson (1991) argued that for service quality to be analysed in a given context, price must be considered. An individual's social environment, society and reference groups, as well as past experience were expected to determine value judgements (Edvardsson & Gustavsson, 1991). Caruana, Money, and Berthon (2000) empirically identified customers' personal characteristics as important in assessing value, but not quality. Rust and Oliver (1994) suggested that, as value assessments included quality and price perceptions, a service could be of excellent quality, but still be rated as poor value if the price was too high. Value perceptions were found by Hightower et al. (2002) to be influenced by positive effect and service quality, which in turn, impacted on behavioural intentions.

In understanding the role of low priced services, Caruana et al. (2000) suggested that higher levels of service quality were only worthwhile to the extent that customers believed that value was being enhanced. The authors argued that although an offering may not be the best in terms of quality, a competitive price could contribute to high levels of satisfaction through value. Although value did not have a strong independent effect on satisfaction within their empirical research, the negative interaction between service quality and value did have a negative effect on satisfaction (Caruana et al., 2000).

Bolton and Drew (1991) empirically determined that service quality and value were distinct constructs. Customers' assessments of service value were positively related to their evaluations of service quality. They concluded that perceived service value was a richer, more comprehensive measure of customers' overall evaluation of a service than service quality (Bolton & Drew, 1991).

2.7.4 Behaviours Related to Service Quality and Satisfaction

Zeithaml et al. (1996) argued that behavioural intentions had higher validity and richer diagnostic value than overall service quality and customer satisfaction because behavioural intentions were related to actual behaviours. Increasing favourable behavioural intentions has been linked to improving service quality (Zeithaml et al., 1996), increased levels of satisfaction (Madrigal, 1995; Swan & Trawick, 1981), the physical environment (Wakefield & Blodgett, 1999), feelings of excitement and pleasure (Wakefield & Blodgett, 1999), positive effect and value (Hightower et al., 2002) and quality of play (Cyrenne, 2001).

Within a sporting context, Madrigal (1995) argued that a satisfactory experience from attending sports events was thought to be an important predictor of the likelihood of attending future events. Wakefield and Blodgett (1999) concluded that the tangible, physical environment played a critical role in determining customers' subsequent behavioural intentions in leisure service settings. The authors also linked repatronage intentions and favourable recommendations with feelings of excitement and pleasure.

Owen and Weatherston (2002b) investigated the determinants of attendance at New Zealand rugby union matches in the Super 12 competition. Attendance was theorised to be a function of several potential economic and sporting factors[16]. The major determinants of attendance were 'attendance at the previous match at that venue (+)', 'whether a game involved a traditional rivalry (+)', 'whether the game involved a non-New Zealand team (-)', 'quality of rugby (+)' (as proxied by home-team try-scoring records in previous matches) and, with somewhat lower reliability, 'opposition teams that are having a successful season (+)', 'rain on the day of the match (-)' and the 'stage of the season (+ as the end of the round-robin stage approaches)'. Owen and Weatherston (2002b) concluded that the factors that most affected attendance reflected habit and tradition, such as lagged attendance, traditional rivalries and antipathy towards

[16] These were match specific factors reflecting the environment (such as temperature and rain), the entertainment value, characteristics of the opposition, player characteristics, recent success, seasonal uncertainty and match uncertainty.

non-New Zealand teams. The other contributing factors such as rainfall and team placings were thought to be beyond the control of sports administrators.

Cyrenne (2001) also expected the quality of play to influence positive behavioural intentions, such as the demand for tickets. Additionally, Laverie and Arnett (2000) reported that in a sporting context, the importance of the team to a particular fan group was thought to be a better predictor of attendance, regardless of satisfaction levels. Involvement, identification and satisfaction were also thought to relate to future fan behaviours (Laverie & Arnett, 2000). The importance of the team, or fanship, is reviewed in Section 2.7.5.

2.7.5 Fanship

In analysing satisfaction and consumer emotions, Westbrook and Oliver (1991) determined that consumers who were mildly unemotional were likely to experience similar levels of satisfaction, while those with high emotional attachment were likely to experience satisfaction at more extreme levels – either high or low. Furthermore, research into emotional responses to products determined that involvement was heightened by increases in product relevance to the consumer (Mano & Oliver, 1993). With relation to services that were essentially performances, Deighton (1994) described involvement with an event as a crucial outcome.

Ferrand and Pages (1999) suggested that the image of the sporting organisation had a high emotional content and that consuming the sports offering was complex. In the consumption of leisure services such as sporting events, Wakefield and Blodgett (1994; 1999) argued that hedonic motives, in which spectators seek emotional arousal or pleasure, were the key drivers.

Hightower et al. (2002) found empirical evidence for the importance of involvement in the marketing of hedonic services. They concluded that in order to increase attendance at sporting events, marketers would have to improve efforts to market to those fans who were less knowledgeable about the sporting event itself. They also suggested that involvement could potentially be an important explanatory construct for hedonic services, especially with regard to the marketing of sports activities where fans were involved in the consumption of the event (Hightower et al., 2002).

A fan has been defined by Hunt, Bristol, and Bashaw (1999) as an enthusiastic devotee of a sport in general, a specific league or team, or a personality (players, coach/managers, broadcast announcer or other individuals who had strong associations

with a team or sport). The fan was deemed to have some level of attachment with one of the above, and manifest their attachment through specific behaviour as 'enthusiastic consumers'. They noted that fans devotion, underlying motivation, and actual sports-related behaviour could vary from fan to fan (Hunt et al., 1999).

Underwood et al. (2001) suggested that kinship with the fellow fan contributed greatly to a sense of self, where self was psychologically intertwined with the fate of the team and other fans. Madrigal (1995) argued that greater individual association with the team would be sought by fans who viewed their association with a team as an important facet of their self identity.

Identity salience was empirically found by Laverie and Arnett (2000) to have explained more variance in fan attendance than satisfaction. They suggested that in order to understand what motivates fans to attend games, research must assess the importance of the team to fans (Laverie & Arnett, 2000). Deighton (1994) suggested that by intensifying involvement with an event, an audience had a tighter sense of identification with the action.

2.8 Chapter Summary

This chapter presented the relevant literature regarding the conceptualisation and measurement of service quality, and the relationship of service quality to related constructs such as satisfaction, value and favourable behavioural outcomes. It also presented an overview of the literature specific to service quality in the sports and recreation industry.

The major changes in the conceptualisation and measurement of service quality that primarily occurred as a result of the large amount of discussion and debate surrounding the SERVQUAL measurement scale (Parasuraman et al., 1991; Parasuraman et al., 1988, 1994) were outlined.

The distinct characteristics of services unique to the marketing of sporting events for spectators were discussed. Particular attention was paid to those service quality dimensions that were under the direct control of sports marketers. Fanship, a construct unique to the marketing of sports events to spectators was introduced. The definition and causal direction of the service quality, satisfaction and value constructs were presented.

Chapter 3: Conceptual Gaps and Hypotheses

3.1 Introduction

This chapter discusses the conceptual gaps identified in the literature review presented in Chapter Two. A conceptual model of spectator satisfaction is presented, and the thirteen hypotheses tested in this study are discussed. The testing of the hypotheses will also address the following four research objectives:

(i) To identify the dimensions of service quality for a professional sport in New Zealand as perceived by spectators.

(ii) To determine the effects of service quality on the related constructs of satisfaction, value, and future intentions.

(iii) To identify the effects of fanship (enduring involvement) on service quality, satisfaction, and future intentions.

(iv) To identify the least, and most important service quality dimensions as perceived by spectators of a professional sport in New Zealand.

3.2 Conceptual Gaps in the Literature

The first conceptual gap in the literature relates to a lack of published research with regard to sports spectators' perceptions of service quality in professional sport. This gap is important as relatively few research papers have been published about how the consumer enjoys sport as a spectator (Theodorakis et al., 2001), and the identification of service quality dimensions and how they influence spectators' evaluations of the event experience is critical for creating and maintaining a competitive advantage to achieve organisational success (Hightower et al., 2002; Kennett et al., 2001).

The second conceptual gap in the literature relates to a lack of published research and unifying theory regarding constructs related to service quality such as satisfaction, value, and favourable future intentions. This gap is important as quality perceptions are not thought to occur in isolation from value and satisfaction[17], and thus far there has

[17] See Chapter Two, Section 2.7.

been limited international research and a lack of consensus in the international literature.

The third conceptual gap in the literature relates to a lack of research on fanship on perceptions of service quality, satisfaction, and favourable behavioural intentions. Hightower et al. (2002) expected fanship to be a potentially important explanatory construct for hedonic services, especially with regard to the marketing of sports activities and suggested that it be included in future studies. This gap is important for the marketing of spectator sports because the perceptions of service quality dimensions will be only one determinant of service quality perceptions, satisfaction judgements, and favourable future intentions.

The fourth conceptual gap in the literature relates to a lack of research pertaining to the service quality dimensions that spectators perceive to be more or less important. This gap is important, as sports marketers cannot be confident that they are measuring the aspects of sport that spectators perceive as important, and may not resource these areas appropriately.

3.3 Hypothesis Development

Based on the review of the literature in Chapter 2, and the conceptual gaps identified in the literature (as discussed in Section 3.2), a conceptual model was developed (see Figure 3-1). The hierarchical model of service quality suggests that spectators are expected to form perceptions of each of three primary dimensions; interaction quality, physical environment quality and outcome quality in order to form an overall service quality perception. Spectator's perceptions of service quality are then expected to influence both value and satisfaction perceptions, which in turn, will affect favourable future intentions. Fanship is expected to have an influence on the service quality, satisfaction, and favourable future intentions constructs. Twelve hypotheses were established to test each path in the model, and one to test the relative importance of the service quality dimensions.

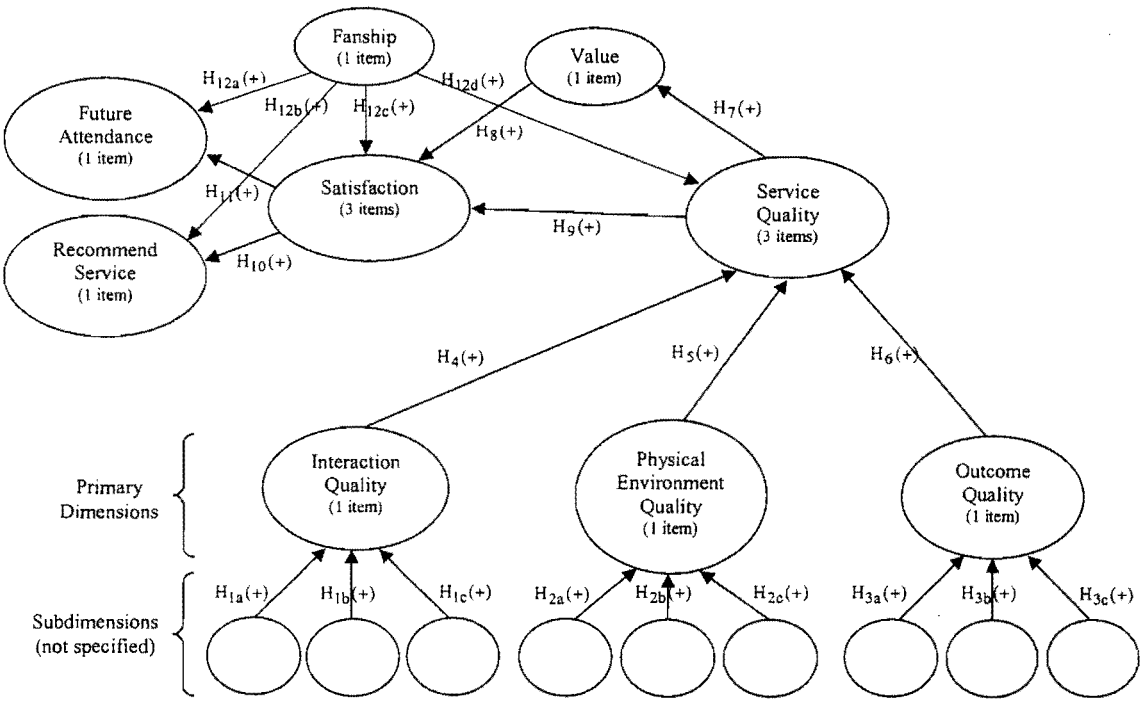

Figure 3-1: Spectator Satisfaction in Professional Sport: A Conceptual Model

3.3.1 Hypotheses Relating to Research Objective 1

Cronin and Taylor (1994) suggest that dimensional structures need to be confirmed for each research setting, and customer satisfaction and service quality scales have been found to be culturally sensitive (Ueltschy & Krampf, 2001). The subdimensions of interaction quality, physical environment quality, and outcome quality will be specifically identified for spectators of professional sport in New Zealand. This approach supports the recommendations of Burton et al. (2001), Dabholkar et al. (1996), Kim and Kim (1995), and Powpaka (1996).

As discussed in Chapter 2, Section 2.6, there are several potential subdimensions that can influence spectators' perceptions of interaction quality, physical environment quality and outcome quality. The subdimensions that will be identified in this study are expected to positively affect each of the primary dimensions as found by Brady and Cronin (2001). Accordingly, the following three hypotheses are proposed:

H_1 : Higher perceptions of each of the interaction quality subdimensions (H_{1a}, H_{1b}, and H_{1c}) will positively effect interaction quality perceptions.

H_2 : Higher perceptions of each of the physical environment subdimensions (H_{2a}, H_{2b}, and H_{2c}) will positively effect physical environment quality perceptions.

H_3 : Higher perceptions of each of the outcome quality subdimensions (H_{3a}, H_{3b}, and H_{3c}) will positively effect outcome quality perceptions.

Perceived service quality has been determined by Brady and Cronin (2001) to be influenced by the primary dimensions; interaction quality, physical environment quality and outcome quality. Considerable support in the sport and recreation field is found for the inclusion of these three primary dimensions as discussed in Chapter 2, Section 2.6. In view of these findings, the following hypotheses are formulated:

H_4 : Higher perceptions of the quality of service interactions will positively affect service quality perceptions.

H_5 : Higher perceptions of the quality of the physical environment will positively affect service quality perceptions.

H_6 : Higher perceptions of the quality of the service outcome will positively affect service quality perceptions.

3.3.2 Hypotheses Relating to Research Objective 2

As outlined in Section 2.7.2, satisfaction is thought to have a number of antecedents. Two well documented antecedents are service quality (Brady et al., 2002; Cronin & Taylor, 1992) and value (Caruana et al., 2000). Also, value judgements are expected to be made within the context of service quality perceptions (Edvardsson & Gustavsson, 1991). As a result, the following hypotheses are proposed:

H_7 : Higher perceptions of overall service quality will positively affect service value judgements.

H_8 : Higher perceptions of service value judgements will positively affect satisfaction in a sporting contest.

H_9 : Higher perceptions of overall service quality will positively affect satisfaction in a sporting contest.

Outlined in Section 2.7.3 are some of the behaviours related to service quality and satisfaction. As a satisfactory experience from attending a sporting event is thought to be an important predictor of attending future sporting events (Madrigal, 1995), these behavioural intentions are conceptualised to arise from total satisfaction. The following hypotheses are proposed to capture this effect:

H_{10} : Higher perceptions of satisfaction will positively affect the intention to recommend the service to others.

H_{11} : Higher perceptions of satisfaction will positively affect the intention to attend future sporting events.

3.3.3 Hypothesis Relating to Research Objective 3

Fanship (emotional involvement with a team) is thought to be an important construct for the marketing of sporting events (Hunt et al., 1999; Laverie & Arnett, 2000). Thus, the following hypothesis is proposed:

H_{12} : Higher levels of fanship will positively affect (a) intention to attend future sporting events, (b) intention to recommend the service to others, (c) perceptions of satisfaction, and (d) perceptions of service quality.

3.3.4 Hypothesis Relating to Research Objective 4

Although research has been conducted for the physical environment for sport and recreation (Hightower et al., 2002; Wakefield & Blodgett, 1994, 1996), it's comparative importance has yet to be analysed. This is also true of interaction quality and outcome quality, as well as for each of the subdimensions. The following hypothesis is therefore proposed:

H_{13} : Spectators will vary in their perceptions' of the importance of (a) each of the primary dimensions, and (b) each of the subdimensions.

3.4 Chapter Summary

Chapter Three identified four conceptual gaps in the literature pertaining to spectator satisfaction in professional sport. A conceptual model was presented, along with 13 testable hypotheses.

Chapter 4: Research Design and Methodology

4.1 Introduction

This chapter outlines the research plan and methodology used to test the thirteen hypotheses, stated in Section 3.3, and to satisfy the four research objectives, stated in Section 3.1. The sample derivation and expected sample size will be explained, as well as the methods of data collection. The questionnaire design and data analysis techniques will also be discussed.

4.2 Sample Derivation

The lack of published research relating to Spectator Sports in New Zealand made it necessary to collect primary data to test the thirteen hypotheses and satisfy the research objectives of this study.

Cross-sectional data were collected on a single occasion during the evening of Saturday, the 27th of March 2004. Data were collected from a systematic random sample of spectators aged over 18 years who were about to attend a Super 12 Rugby Union match. Spectators aged less than 18 years were excluded from the sample, as it was expected they might have encountered difficulties interpreting the survey questions.

4.3 Sample Size

Hair, Anderson, Tatham, and Black (1998) recommended a sample size of 100 or larger for factor analysis, with at least five times as many observations as variables to be analysed, and a more acceptable size of ten-to-one. Thus, the minimum sample size needed to be 240 respondents, or 480 respondents as a more acceptable size, as there were 48 variables to be factor analysed.

Sample size in multiple regression has been described as the most influential single element under the control of the researcher in designing an analysis. For multiple regression analysis, a general rule is to have at least five times as many observations as there are variables to be analysed. However, to increase the generalisability of the sample, a desired level of between 15 to 20 observations for each independent variable is more appropriate (Hair et al., 1998). Therefore, at least 75 to 100 observations are

required if each individual regression equation has 5 independent variables. The exact number of independent variables depends on the results of the factor analysis.

4.4 Method of Data Collection

New Zealand's most popular spectator sport is Rugby Union (Owen & Weatherston, 2004). Twelve volunteers were asked to hand out questionnaires prior to a match between two teams in the international Super 12 competition held at Jade Stadium in the South Island of New Zealand[18]. This particular Super 12 match was chosen by the researcher as it was expected that there would be a proportion of spectators from outside the host region, therefore, increasing the generalisability of the sample results. The questionnaires were handed to spectators as they entered the stadium as they were expected to come through the gates more gradually, as opposed to a much more rapid post match departure.

There are six entry gates at Jade Stadium. Two volunteers were placed outside each of the gates. Each volunteer was given one hundred questionnaires and requested to systematically hand a pre-paid envelope containing the questionnaire to every fifth person walking towards the entry gates[19]. The volunteers were instructed to explain that the envelope contained a university survey, and to request respondents to fill the questionnaire in at home, and mail it back in the pre-paid envelope. Further, the volunteers told the respondents that if they did so, they would be entered into a draw to win $200 cash[20] (see the covering letter in Appendix 2). A total of 1,200 questionnaires were distributed[21].

4.5 Questionnaire Design

In order to analyse spectators' perceptions of professional sport in New Zealand, a specific questionnaire was designed. The construct operationalisation, design and format of the questionnaire and the pre-testing procedures are discussed in the following sections.

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[18] The match was between the Crusaders (from Canterbury) and the Highlanders (from Otago).

[19] If the fifth person declined to take a questionnaire, the volunteers were instructed to hand it to the next person entering the stadium. This was also the case for those under the age of 18 years. Following that person receiving the survey, every fifth person was subsequently sampled.

[20] While this method of sampling was efficient for collecting data from a population contained within a stadium, it did not allow for a second prompting, or a follow up effort. As this methodology was reliant on respondents returning the survey without further input from the researcher, the cash incentive was given to increase the response rate.

[21] A 30% response rate (not unusual for mail surveys) would therefore yield a sample of 360.

4.5.1 Construct Operationalisation

The extensive review of the literature presented in Chapter 2 identified the potential primary dimensions of service quality for spectators watching sporting events in New Zealand. However, in order to identify the potential subdimensions customers consider when evaluating the quality of the interaction, physical environment, and outcome dimensions of a service experience, it was necessary to conduct focus group interviews.

Focus group research has been used to "reveal consumer's hidden needs, wants, attitudes, feelings, behaviours, perceptions, and motives regarding services, products, or practices" (Hair, Bush, & Ortinau, 2000, p.223). In addition, Greenbaum (1998) noted that focus group interviews were most popular with attitude research, such as service quality evaluations. When combined with 'quantitative' methods such as questionnaire surveys, focus group interviews are described as critical for developing and creating reliable measurement scales (Hair et al., 2000; Kitzinger & Barbour, 1999). The use of focus group interviews is also consistent with the early service quality research conducted by Parasuraman et al. (1985).

Three focus group interviews were conducted as recommended by Calder (1977). In order for participants to feel comfortable, Hair et al. (2000) recommended that the groups be as homogeneous as possible. Therefore, the first two focus groups were divided by age. All of the participants had been to at least two matches in the previous Super 12 season. The first focus group consisted of eight participants under the age of 35, with two female participants. The second focus group consisted of eight participants over the age of 35, with two female participants. The third focus group consisted of seven members from a range of age groups, with three female participants.

The domain of the construct was specified to the interviewees at the start of the focus group interviews, as recommended by Churchill (1979). Participants were then asked to explain all of the factors that contributed to their judgements of service quality as spectators of Super 12 Rugby Union matches. They were asked to consider the whole experience - from booking the tickets, to leaving the stadium at the end of the match - and all of the interactions that occurred in between. They were then asked to identify the factors that they considered to be the most influential in their assessment of the quality of the service experience for Super 12 matches. After this, the participants were asked to place these factors under the primary dimensions identified by Brady and Cronin (2001). At this stage, they were also encouraged to list any additional factors that influenced their perception regarding interactions, environments, and outcomes in a

recent service experience. The importance of any factors that could not be listed under the primary dimensions was discussed, in order to establish if any additional primary dimensions should be included in the questionnaire.

The focus group interviews were recorded and transcribed, and along with the findings from the literature review, they were used as the basis for the item generation in the questionnaire development.

4.5.2 Design and Layout of the Survey Instrument

The questionnaire contained five sections. Sections A, B and C contained the interaction quality, physical environment quality, and outcome quality statements. The items were grouped in accordance with each of the primary dimensions, as perceived by the focus group participants, and the researcher. Section D contained the questions on service quality, satisfaction and value. Section E contained demographic and behavioural questions.

In accordance with recent research (Theodorakis et al., 2001), the instrument did not include an expectation battery. Additionally, all items were positively worded as recommended by Carman (1990) and Parasuraman et al. (1991). Respondents were requested to evaluate their overall experiences at Super 12 matches, and not to concentrate on one particular match. This approach is consistent with the modifications made by McDonald et al. (1995), who changed the focus from a single encounter, to multiple service encounters.

All items in Sections A, B, and C used a standard seven-point Likert-type scale ranging from Strongly Disagree (1) to Strongly Agree (7)[22]. Section D also used a standard seven-point Likert-type scale. Five of the items ranged from Strongly Disagree (1) to Strongly Agree (7). One item measuring Satisfaction ranged from Very Dissatisfied (1) to Very Satisfied (7), and one item measuring Service Quality ranged from Poor (1) to Excellent (7). Section E contained three items based on a standard seven-point Likert-type scale. Two items measuring behavioural intentions ranged from Highly Unlikely (1) to Highly Likely (7), and one item measuring Fanship ranged from Casual Follower (1) to Avid Fan (7).

[22] A seven-point anchored scale was selected following Schall (2003) who determined that a seven-point anchored scale was the optimum size for hospitality-industry questionnaires when comparing five, seven and ten point scales.

The constructs of Service Quality and Satisfaction[23] were measured with multiple items, so that they could be tapped more extensively. By combining three or more items reliability tends to increase and measurement error tends to decrease, as compared to single item measures (Churchill, 1979). However, in an attempt to keep the questionnaire relatively short, the constructs of Value, Fanship, Intention to Recommend, and Intention to Attend were measured using a single item. The risk of measuring these constructs with only a single item, is that the measurement error that could occur in a single question will be increased (Hair et al., 1998).

4.5.3 Pre-testing Procedures

As the questionnaire was developed specifically for this research, it was necessary to conduct a pre-test to assess its reliability and validity. A pre-test of 30 spectators aged 18 years and over, who had attended at least two Super 12 matches in the past year was conducted. As well as responding to the statements in the questionnaire, respondents were requested to comment on any questions that they thought were ambiguous or unclear, or that they were unable to answer. Some minor wording modifications to the questionnaire were made as a result of this process. The final version of the questionnaire is in Appendix 1.

4.6 Data Analysis Techniques

In order to address the first research question, exploratory factor analysis was used to determine the underlying factors that made up the subdimensions. Multiple regression analysis was then used to test the conceptual model, and as a result, all of the thirteen hypotheses.

4.6.1 Factor Analysis

Factor analysis is a multivariate statistical technique concerned with the identification of structure within a set of observed variables (Stewart, 1981). It is an interdependence technique in which all variables are simultaneously considered (Hair et al., 1998). The term factor analysis applies to a body of techniques, as there are a variety of ways in which linear combinations of variables can be formed (Churchill, 1987).

[23] The subdimensions that make up each of the primary dimensions were expected to be multi-item measures also. See Section 4.6.2.

Marks (1976) described the primary function of factor analysis as the aggregation of observed variables into larger dimensions called factors, thereby aiding the researcher in interpretation by reducing redundancy in a group of variables that possess high intercorrelation. Hair et al. (1998) cite two primary uses for factor analysis – summarisation and data reduction[24].

The following sections will overview the different types of factor analysis, the assumptions of factor analysis, factor rotation, and interpretation of the resulting factors.

4.6.1.1 Modes of Factor Analysis

There are a number of modes of factor analysis (see Table 4-1), all of which provide information about the dimensional structure of data (Stewart, 1981). The appropriate mode of factor analysis depends on the objectives of the research (Hair et al., 1998).

Table 4-1: Modes of Factor Analysis (Stewart, 1981)

Technique	Factors are loaded by	Indices of association are computed across	Data are collected on
R	Variables	Persons	One occasion
Q	Persons	Variables	One occasion
S	Persons	Occasions	One variable
T	Occasions	Persons	One variable
P	Variables	Occasions	One person
O	Occasions	Variables	One person

In this study, the objective is to factor a set of variables collected at the same time from a number of individuals. Therefore, the most common mode of factor analysis, R factor analysis, will be used to analyse a set of variables to identify latent dimensions (Hair et al., 1998).

4.6.1.2 Types of Factor Analysis

Two general types of factor analysis exist; exploratory factor analysis, and confirmatory factor analysis (Stewart, 1981). Again, their use is dependent on the purpose of the analysis being conducted (Hurley et al., 1997). Where the underlying dimensions of a data set are unknown, exploratory factor analysis is appropriate. Confirmatory factor

[24] Stewart (1981) cite three general functions for factor analysis: (1) minimising the number of variables while maximising the amount of information in the analysis, (2) searching for qualitative and quantitative distinctions in data, and (3) testing hypotheses regarding the number of dimensions underlying a set of data.

analysis can be used for theory building by testing hypotheses about the structure of a data set (Stewart, 1981).

Exploratory factor analysis, adopted for this study, can utilise two basic models to obtain a solution; common factor analysis and component analysis (Hair et al., 1998). Both techniques are commonly used, and the selection of one method over the other depends on two criteria: "(1) the objectives of factor analysis and (2) the amount of prior knowledge about the variance of the variables" (Hair et al., 1998, p.102).

The common factor model is most appropriate when the objective of the research is to identify the latent dimensions or constructs represented in the original variables, and the researcher has little knowledge regarding either specific or error variances (Hair et al., 1998). However, common factor analysis is noted to suffer from several problems, and as a result, using component analysis has become more widespread. This type of exploratory factor analysis is appropriate if the concern of the research is prediction, or the minimum number of factors needed to account for the maximum portion of the variance. It is appropriate when prior knowledge suggests that specific and error variance represents a relatively small proportion of the total variance. Therefore, component factor analysis was adopted for use in this study.

4.6.1.3 Tests for Determining Appropriateness of Factor Analysis

Regardless of the type of factor analysis being utilised, there are number of critical conceptual and statistical assumptions underlying factor analysis (Hair et al., 1998).

Conceptually, it is assumed that there is some underlying structure within a set of variables. Conceptual appropriateness is especially important, as the technique has no means of determining appropriateness other than the correlations among variables. Hair et al. (1998) also noted that including items in a factor analysis that the researcher intends to use to support a dependent relationship is inappropriate. Therefore, to satisfy this conceptual constraint, only the items that were considered to be subdimensions formed part of this analysis.

Factor analysis relies on the statistical assumptions of linearity, normality, and homoscedasticity to the extent that they may diminish observed correlations (Hair et al., 1998). If the correlations in a set of data are sufficiently high, the statistical assumptions do not have to be met.

Hair et al. (1998) suggested that there are several methods to determine whether the correlations in the data matrix are sufficient for factor analysis. These are:

(i) Examination of the Correlation Matrix;

(ii) Inspection of the Anti-Image Correlation Matrix

(iii) Bartlett's Test of Sphericity;

(iv) The Kaiser-Meyer-Olkin Measure of Sampling Adequacy.

4.6.1.4 Examination of the Correlation Matrix

An examination of the correlation matrix is a simple method of determining the appropriateness of factor analysis. As factor analysis is concerned with the homogeneity of items, low correlations throughout the correlation matrix would suggest that it is not appropriate (Stewart, 1981). Therefore, visual inspection of the correlation matrix should reveal a number of substantial correlations greater than .30 (Hair et al., 1998).

4.6.1.5 Inspection of the Anti-Image Correlation Matrix

The correlations among variables in the data matrix can also be determined by inspection of the anti-image correlation matrix. This represents the negative value of the partial correlations (Hair et al., 1998). If variables share common factors, the partial correlation coefficient between pairs of variables should be small when the linear effects are eliminated. Therefore, if the anti-image matrix has many non-zero off-diagonal entries, the correlation matrix is not appropriate for factoring (Stewart, 1981).

4.6.1.6 Bartlett's Test of Sphericity

The Bartlett's test of sphericity is another widely used technique to test the correlations in a data matrix. It provides the statistical probability that the correlation matrix has significant correlations among at least some of the variables (Hair et al., 1998). Bartlett's test of sphericity is computed by the formula:

$$-\left[(N-1)-\left(\frac{2P+5}{6}\right)\right]Log_e|R| \qquad \textbf{Equation 4-1: Bartlett's Test of Sphericity}$$

where: N is the sample size,

P is the number of variables, and

$|R|$ is the determinant of the correlation matrix.

The hypothesis tested is that the correlation matrix came from a population of variables that are independent (Stewart, 1981). Rejection of the hypothesis is an indication that the data are appropriate for factor analysis.

4.6.1.7 The Kaiser-Meyer-Olkin Measure of Sampling Adequacy

The Kaiser-Meyer-Olkin measure of sampling adequacy provides a measure of the extent to which the variables belong together, and are therefore appropriate for factor analysis (Stewart, 1981).

$$MSA = \frac{\sum\sum_{j \neq k} r_{jk}^2}{\sum\sum_{j \neq k} r_{jk}^2 + \sum\sum_{j \neq k} q_{jk}^2}$$

Equation 4-2: Measure of Sampling Adequacy

where: q_{jk}^2 is the square of the off-diagonal elements anti-image correlation matrix and

r_{jk}^2 is the square of the off-diagonal elements of the original correlations

The index ranges from 0 to 1, reaching 1 when each variable is perfectly predicted without error by the other variables (Hair et al., 1998). Kaiser and Rice (1974, cited in Stewart, 1981) gave the following definitions for appropriateness: .90+ - marvellous, .80+ - meritorious, .70+ - middling, .60+ - mediocre, .50+ - miserable, and below .50 – unacceptable.

4.6.1.8 Factor Extraction in Principal Components Analysis

Stewart (1981) described the decision regarding the number of factors to be extracted as generating more controversy and misunderstanding than any other issue regarding factor analysis. The findings of many early studies suggested that over-factoring by one or two factors had less severe consequences for the final solution than taking too few factors (Stewart, 1981). An exact quantitative basis for deciding the number of factors to extract has not been developed (Hair et al., 1998). While there is no "correct" answer, a number of rules of thumb have been advanced (Churchill, 1987). Stewart (1981) recommended the use of the roots criterion, and the scree test, as an effective means of determining the number of factors to extract.

4.6.1.9 The Roots Criterion

The latent root criterion procedure is based on the rationale that any individual factor should account for the variance of at least a single variable if it is to be retained for interpretation (Hair et al., 1998). It has become the universal default criterion for most

computer programs, which stop the extraction process when all factors have eigenvalues greater than 1.0 (Stewart, 1981). Each variable contributes a value of 1 to the total eigenvalue – thus all factors having latent roots or eigenvalues greater than 1 are considered significant. This method is most effective and reliable when the number of variables in the factor analysis is between 20 and 50 (Hair et al., 1998).

4.6.1.10 The Scree Test

The scree test employs a plot of the size of the latent roots against the number of factors in their order of extraction (Churchill, 1987).

A large break in the plot is taken to indicate the point where factoring should stop (Stewart, 1981). Stewart (1981) explained the application of this procedure:

> "A straight edge is laid across the bottom portion of the roots to see where they form an approximately straight line. The point where the factors curve above the straight line gives the number of factors, the last factor being the one whose eigenvalue immediately precedes the straight line" (p.58).

While the scree test has proved popular with researchers, it has also been criticised for being open to subjective interpretation (Kim & Mueller, 1978).

4.6.1.11 Factor Rotation

Factor loadings are used to interpret the role each variable plays in defining each factor. However, unrotated factor solutions may not provide a meaningful pattern of variable loadings. Rotation will simplify the rows and columns of the factor matrix and maximise a variable's loading on a single factor, thus facilitating interpretation (Hair et al., 1998).

Orthogonal and oblique rotations are commonly used. Orthogonal rotations are also called rigid or angle-preserving rotations, since they preserve the right angles that exist among the factor axes. Oblique rotations do not, which means that the factors themselves can be correlated (Churchill, 1987). Stewart (1981) noted that the rotation employed should have little impact on the interpretation of the results, and recommended that both an oblique rotation and an orthogonal rotation be performed, particularly in exploratory research. Therefore, both an oblique and an orthogonal rotation were used in this study.

4.6.1.12 Orthogonal Rotation

Hair et al. (1998) described orthogonal rotations as the simplest case of rotation whereby the axes are maintained at 90 degrees. Three major orthogonal approaches have been developed: QUARTIMAX, VARIMAX, and EQUIMAX. VARIMAX is the most common rotation procedure (Hair et al., 1998; Stewart, 1981). VARIMAX attempts to force the entries in the columns to be near 0 or 1, and therefore "clean-up" the factors on the factor loading table. QUARTIMAX attempts to "clean-up" the variables while maintaining the right angles between the factors (Churchill, 1987). The EQUIMAX method is a combination of both the VARIMAX method, which simplifies the factors, and the QUARTIMAX method, which simplifies variables. It has yet to gain widespread acceptance and is used infrequently (Hair et al., 1998). The VARIMAX rotation was used in this study.

4.6.1.13 Oblique Rotation

Oblique rotations are similar to orthogonal rotations, except that they allow correlated factors instead of maintaining independence between the rotated factors (Hair et al., 1998). Stewart (1981) found that oblique rotations were particularly useful in theory building, and that they play a significant role in the development of any theory involving consumer behaviour.

In relation to service quality dimensions, Parasuraman et al. (1994) found that while SERVQUAL relied on five distinct dimensions, the factors representing those dimensions were intercorrelated and overlapped to some degree. Parasuraman et al. (1991) stated:

> "Though the SERVQUAL dimensions represent five conceptually distinct facets of service quality, they are also interrelated, as evidenced by the need for oblique rotations of factor solutions in the various studies to obtain the most interpretable factor patterns" (p.442).

Realistically, very few factors are uncorrelated, so oblique rotations are appropriate for developing theoretically meaningful factors or constructs (Hair et al., 1998). Correlated factors and hierarchical factor solutions are noted to be intuitively attractive and theoretically justified in many marketing applications (Stewart, 1981). In addition to the VARIMAX orthogonal rotation, an oblique rotation was also undertaken in this study.

4.6.1.14 Interpretation of Factors

When interpreting factors, a decision must be made regarding the factor loadings[25]. Hair et al. (1998) consider factor loadings greater than $\pm .30$ a minimal level; loadings of $\pm .40$ more important; and loadings greater than $\pm .50$ practically significant[26]. With regard to the size of the sample, sample sizes of 350 or greater would allow loadings of .30 and over to be considered significant (Hair et al., 1998). Hair et al. (1998) offer three guidelines for assessing the significance of factor loadings:

> "(1) the larger the sample size, the smaller the loading to be considered significant; (2) the larger the number of variables being analysed, the smaller the loading to be considered significant; (3) the larger the number of factors, the larger the size of the loading on later factors to be considered significant for interpretations" (p.112).

Interpretation of the factor solution is further complicated as most factor solutions do not result in simple structure solutions[27]. Ideally, the number of significant loadings on each row of the factor matrix should be minimal (Hair et al., 1998).

Naming of the factor, or dimension, is not derived or assigned by the computer program. It is therefore necessary for the researcher to intuitively label the factors, based on the underlying variables for each factor. The variables with the highest factor loadings are also considered more important, and this should be reflected in this process (Hair et al., 1998).

4.6.2 Summated Scale

In order to reduce measurement error through reliance on a single response, the creation of summated scales[28] after exploratory factor analysis is recommended by Hair et al. (1998). All of the variables loading highly on a factor are combined, and the sum or average score of the variables is used as the replacement variable (Hair et al., 1998). Bryman and Cramer (1999) recommended using the mean scores of the items in order to reduce the effects of missing values, and to allow the scores to correspond back to the scale between 1 and 7. However, before creating a summated scale, the content validity, dimensionality, and reliability of the measure must be assessed.

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[25] The factor loading is the correlation of the variable and the factor (Hair et al., 1998).
[26] To account for 50% of the variance in the factor, a loading must exceed .70 (Hair et al., 1998).
[27] Where variables have significant loadings on one factor.
[28] Multiple items are summed or averaged to create a new variable.

4.6.2.1 Content Validity

Content validity[29] of the variables to be included in the summated scale considers the practical and theoretical inclusion of items. It is a subjective assessment of the correspondence between the individual items and the concept (Hair et al., 1998). A measure is said to display content validity if the sample is appropriate and the items "look right" (Churchill, 1979).

4.6.2.2 Dimensionality

Dimensionality should also be assessed. Each summated scale should include items that are unidimensional, meaning that they are strongly associated with each other and represent a single concept. Items should therefore load highly on a single factor (Hair et al., 1998).

4.6.2.3 Reliability

Reliability of the measure should also be assessed. Cronbach's (1951) alpha is the most widely used measure to assess the internal consistency of the scale. It represents the mean of the correlations between all of the different possible splits of the scale into two halves (Cohen, Cohen, West, & Aiken, 2003). Churchill (1979) recommended that a Cronbach Coefficient Alpha greater than .60 is adequate for a newly developed questionnaire for the scale to express reliability.

4.6.3 Regression Analysis

Following the factor analysis, and the subsequent creation of the summated scales, multiple regression analysis was utilised to test the paths in the conceptual model, and therefore, test the 13 hypotheses.

Multiple regression analysis is a general statistical technique used to analyse the relationship between a single dependent variable and several independent variables (Hair et al., 1998). In addition to simple prediction, multiple regression is also used for the purpose of understanding phenomena (Cohen et al., 2003). The most direct interpretation of the regression variate is a determination of the relative importance of each independent variable in the prediction of the dependent measure (Hair et al., 1998).

Multiple regression has been used following exploratory factor analysis to determine the importance of the dimensions bound to a dependent variable (Marks, 1976). For

[29] Also known as face validity.

example, Carman (1990) postulated that a complete attitude model of service quality must measure the effects of importance of individual attributes (independent variables) on perceptions of quality (the dependent variable).

Cronin and Taylor (1994) argued that mathematically (i.e. indirectly) calculating the ability to explain variation in a dependent measure is not the same as directly asking consumers to indicate their perception of the importance of a specific aspect of service. However, their subsequent use of importance weights failed to contribute significantly to the predictive ability of their measures (Cronin & Taylor, 1994). Parasuraman et al. (1994) argued that using weighted scores as independent variables in regression analysis is a form of "double counting", and that this type of analysis is not meaningful when deriving importance weights indirectly. In comparing the direct measurement and indirect measurement of the importance of dimensions, Chu (2002) concluded that the derived importance approach is superior to the stated importance approach for its power of prediction and explanation.

This study adopted the use of unweighted scores to determine the importance and significance of the dimensions identified in the factor analysis, thereby satisfying Research Objective Four.

4.6.4 Statistical Assumptions for Regression

Within the regression equation, assumptions are made with regards to the explanatory variables, as well as the error term (Hill, Griffiths, & Judge, 1997).

Hill et al. (1997) cite two assumptions regarding the explanatory variables; the first is that the explanatory variables are not random variables, and the second is that any one of the explanatory variables is not an exact linear function of any of the others. Another important assumption in multiple regression is that the form or mathematical shape of the relationship between the dependent variable and the independent variables is linear (Cohen et al., 2003). Therefore, the impact of outliers, multicollinearity, and linearity will be discussed.

4.6.4.1 Outliers

A few extreme observations or outliers can potentially influence the estimates of the regression parameters (Maddala, 2001). Outliers are observations that have large residual values, or an observation that is far removed from the rest of the observations (Hair et al., 1998). Therefore, these outlying cases can have a large effect upon the

predictions that are generated (Bryman & Cramer, 1999). Excluding these cases from the analysis must therefore be considered. However, this should be done with care, since deletion of some outliers often results in the generation of further outlying cases (Coakes & Steed, 1997).

Outliers can only be identified with respect to a specific regression model, through a study of the residuals from the estimated regression equation (Maddala, 2001). The residuals of each observation for the regression equations were therefore analysed for large values[30].

4.6.4.2 Multicollinearity

Maddala (2001) described multicollinearity as one of the most misunderstood problems in multiple regression. It arises when the explanatory variables are highly intercorrelated, making the separate effects of each of the explanatory variables on the explained variable difficult to disentangle (Maddala, 2001).

The simplest means of identifying the collinearity between variables is to examine the correlation matrix for the independent variables (Hair et al., 1998). Bryman and Cramer (1999) recommend that the Pearson's r between each pair of independent variables should not exceed 0.80.

Hill et al. (1997) found that the problem with examining only pairwise correlations, is that the multicollinearity relationships may involve more than two of the explanatory variables, which may not be detected. Also, high intercorrelations among the explanatory variables is neither necessary nor sufficient to cause the multicollinearity problem (Maddala, 2001). Maddala (2001) stated that "measures of multicollinearity based solely on high intercorrelations among the explanatory variables are useless" (p.291), and that as long as there is enough variation in the explanatory variables and the variance of the error term is sufficiently small, high intercorrelations need not cause a problem.

Maddala (2001) stated that detection of the effects of multicollinearity can be achieved through an analysis of the R^2, the F-ratio and the t-ratios of individual regression equations. If the R^2 is very high, and the F-ratio highly significant, but the individual t-ratios are all insignificant, multicollinearity is having a significant affect on the regression equations.

[30] Values exceeding 3 standard deviations from the mean were considered outliers.

Hill et al. (1997) recommend the estimation of auxiliary regressions, in which one of the independent variables becomes the dependent variable and is regressed against the remaining independent variables. If the R^2 from the artificial model is high (above 0.80), the implication is that a large portion of the variation in that particular independent variable is explained by other explanatory variables (Hill et al., 1997).

This method is also measured as the variance inflation factor (VIF) and is defined as;

$$VIF(\hat{\beta}_i) = \frac{1}{1-R_i^2}$$ **Equation 4-3: Variance Inflation Factor**

where: R_i^2 is the squared multiple correlation coefficient between x_i and the other explanatory variables (Maddala, 2001). A VIF of greater than 2 is usually considered problematic.

The tolerance value is the reciprocal of the VIF and therefore shows how much of the variance of one explanatory variable is independent of other explanatory variables (Cohen et al., 2003). The tolerance of variable i is defined as $1-R_i^2$, where R_i is the multiple correlation coefficient with the ith independent variable is predicted from the other independent variables. If the tolerance of a variable is very small, it is almost a linear combination of the other independent variables (Norusis, 1994). Tolerance values of 0.10 or less indicate that there may be serious problems of multicollinearity in the regression equation (Hair et al., 1998).

SPSS also provides condition indices. The condition indices are computed as the square roots of the ratios of the largest eigenvalue to each successive eigenvalue. Values greater than 15 indicate a possible problem with collinearity and values greater than 30 indicate a serious problem (Norusis, 1994).

Researchers are also encouraged to examine the results of simple univariate regression analysis with the results of the full multiple regression analysis to see if large unexpected changes occur in the direction and magnitude of the coefficients (Cohen et al., 2003).

4.6.4.3 Linearity

Linearity refers to the relationship between the dependent variable and independent variable that is best summarised by a straight line (Cohen et al., 2003). When the form of the relationship between the independent variables and the dependent variable is not properly specified, the estimates of both the regression coefficients and the standard

errors may be biased. The concept of correlation is based upon a linear relationship and is easily examined through residual plots (Hair et al., 1998). In multiple regression with more than one dependent variable an examination of the residuals shows the combined effects of all independent variables (Hair et al., 1998). Examination of graphical displays to determine if a linear relationship adequately characterises the data is recommended as they can detect a wide range of misspecifications of the form of the relationship (Cohen et al., 2003).

Therefore, analysis of the regressions standardised residual against the standardised predicted value was used in this study, as recommended by Hair et al. (1998). If the assumptions are met, the residuals should be randomly distributed in a band clustered around the horizontal line through zero (Norusis, 1994).

4.6.5 Error Term Assumptions

For each regression equation, the error term is assumed to display the following characteristics: $e_i \sim NID(0, \sigma^2)$. That is, the error terms are distributed normally, independently, with a probability distribution with zero mean, and a constant variance (Hill et al., 1997). Each of these assumptions was therefore tested.

4.6.5.1 Homoscedasticity

Homoscedasticity refers to the assumption of constant variance of the error term - $\text{var}(e_i) = \sigma^2$. That is, each random error is assumed to have a probability distribution with variance σ^2 (Hill et al., 1997). The presence of unequal variances (heteroscedasticity) is one of the most common violations in multiple regression (Hair et al., 1998).

Maddala (2001) cite two basic consequences of heteroscedasticity: (1) the least squares estimators remain unbiased, but inefficient, and (2) the estimates of the variances are biased. This leads to underestimation of the true variance of the ordinary least square estimator and affects confidence intervals, and invalidates the tests of significance of the independent variables.

Inspection of the residual scatterplot of each of the regressions standardised residuals should reveal that the residuals are roughly rectangularly distributed, with most scores concentrated along the 0 point. A clear systematic pattern to the residuals suggests some violation of this assumption.

4.6.5.2 Independence

Multiple regression assumes that the residuals are independent $\text{cov}(e_t, e_s) = 0$[31] (Cohen et al., 2003). Violations can be identified by a consistent pattern in the residuals (Hair et al., 1998). When this assumption is violated, the error terms are autocorrelated. The simplest and most common method of detection is the Durbin-Watson test, where the errors u_t and u_{t-1} have a correlation ρ (Maddala, 2001). It is defined as:

$$dw = \frac{\sum_{2}^{n} (\hat{u}_t - \hat{u}_{t-1})^2}{\sum_{1}^{n} \hat{u}_t^2}$$

Equation 4-4: Durbin-Watson Statistic

where: $\hat{u}_t$ is the estimated residual for period t.

The possible values of the Durbin-Watson statistic range from 0 to 4. If the residuals are not correlated with each other, the value of dw is close to 2. Values less than 2 indicate that adjacent residuals are positively correlated. Values greater than 2 indicate that adjacent residuals are negatively correlated (Freund & Wilson, 1998).

Testing the null hypothesis of no autocorrelation, the following rules apply: if $d < d_L$, we reject the null hypothesis; if $d > d_U$, we do not reject the null hypothesis; and if $d_L < d < d_U$, the test is inconclusive (Maddala, 2001).

4.6.5.3 Normality

Another assumption in multiple regression is that the error terms have normal probability distributions (Hill et al., 1997). Two graphical methods are recommended by Cohen et al. (2003) to provide an indication as to whether the residuals follow a normal distribution. Firstly, a histogram of the residuals is plotted, and a normal curve with the same mean and standard deviation as the data is overlayed. If the distribution is normal, then the histogram and the normal curve should be similar (Cohen et al., 2003). The second graphical method is the normal q-q plot, in which the researcher must assess whether the plot approximates a straight line. If the distribution is normal, the residual line closely follows the diagonal (Hair et al., 1998).

[31] The covariance between two random errors corresponding to any two different observations is zero (Hill et al., 1997).

4.7 Chapter Summary

This chapter has outlined the research plan and methodology used to test the thirteen hypotheses, stated in Section 3.3, and to satisfy the four research objectives, stated in Section 3.1. The sample derivation and expected sample size was explained, as well as the methods of data collection. The questionnaire design and data analysis techniques were also explained.

Chapter 5: Results and Discussion

5.1 Introduction

This chapter presents the results of the analysis outlined in Chapter Four. The data set is examined to ensure the statistical assumptions of factor analysis and multiple regression are met. The results of the factor analysis and multiple regression analysis are presented, and the 13 Hypotheses tested. The results are discussed in terms of their relation to each of the relevant research objectives.

5.2 Sample and Response Rate

Of the 1,200 questionnaires handed out, 478 were returned within the two-week response period. Sixteen were incomplete, or were not suitable for use. This resulted in a total of 462 useable responses, or a 38.5% usable response rate.

This was slightly below the acceptable sample size of 480 suggested by Hair et al. (1998) for factor analysis, but well above the minimum of 240 (refer Chapter 4, Section 4.3). The sample size was deemed to be acceptable for the purposes of this research.

5.2.1 Non-response Bias

The generalisability of the results can be affected by non-response bias (Churchill, 1979). Estimating non-response bias can be achieved through extrapolation, as recommended by Armstrong and Overton (1977). Extrapolation methods are based on the assumption that subjects who respond less readily, answer similarly to non-respondents[32] (Armstrong & Overton, 1977).

Therefore, the means scores across the first 110 respondents who replied in the first week, and the last 110 respondents who replied in the second week were calculated. Independent t-tests were used to determine whether statistically significant differences between the mean for the sum of the subdimensions, the Service Quality items, the Satisfaction items, the Value item, and the Fanship item existed. The results are reported in Table 5-1. No evidence was found to suggest that non-response bias was evident in this study.

[32] 'Less readily' was defined as answering later, or as requiring more prompting to answer (Armstrong & Overton, 1977).

Table 5-1: Independent Samples Test for Non-response Bias

Equal variances assumed

	Levene's Test for Equality of Variances		t-test for Equality of Means				
Dimension	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Satisfaction	0.130	0.718	1.167	218	0.245	0.124	0.106
Service Quality	0.987	0.322	0.977	218	0.330	0.112	0.115
Interaction	0.082	0.774	1.278	218	0.203	0.141	0.110
Physical Environment	0.331	0.566	1.204	218	0.230	0.144	0.120
Outcome	0.422	0.516	0.609	218	0.543	0.063	0.103
Value	0.391	0.532	1.398	218	0.164	0.200	0.143
Fanship	1.364	0.244	1.289	218	0.199	0.273	0.212

5.3 Descriptive Statistics

Section E of the questionnaire was designed to capture some basic demographic details of the respondents involved in the study. Results of the demographic characteristics of respondents are presented in Tables 5-2 to 5-4.

Table 5-2: Gender and Age Results

	Category	Frequency	Percent
Gender	Male	255	55.2
	Female	207	44.8
	Total	462	100.0
Age	18-25	38	8.2
	26-35	61	13.2
	36-45	152	32.9
	46-55	122	26.4
	56-65	64	13.9
	65+	25	5.4
	Total	462	100.0

Table 5-3: Ethnicity Results

	Category	Frequency	Percent
Ethnicity	NZ European	380	82.3
	NZ Maori	11	2.4
	Pacific Islander	1	0.2
	European	32	6.9
	Asian	1	0.2
	New Zealander	27	5.8
	Canadian	2	0.4
	American	2	0.4
	Australian	3	0.6
	South African Indian	1	0.2
	English	1	0.2
	Total	462	100.0

Table 5-4: Occupation Results

	Category	Frequency	Percent
Occupation	Clerical	46	10.0
	Sales/Service	65	14.1
	Student	16	3.5
	Professional	169	36.6
	Tradesperson	55	11.9
	Unemployed	3	0.6
	Labourer	10	2.2
	Farmer	47	10.2
	Manager	9	1.9
	Retired	17	3.7
	Parent/Housekeeper	16	3.5
	Volunteer/Community Worker	5	1.1
	Other	4	0.9
	Total	462	100.0

The teams that the respondents supported are presented in Table 5-5. The two teams playing (the Crusaders and the Highlanders) were supported by nearly 96% of the respondents. The home team (the Crusaders) was supported by 80.5% of the respondents.

Table 5-5: Supporting Team Results

	Category	Frequency	Percent
Supporting Team	Crusaders	372	80.5
	Highlanders	71	15.4
	Hurricanes	4	0.9
	Brumbies	2	0.4
	Reds	1	0.2
	None in particular	12	2.6
	Total	462	100.0

The information on how each of the respondents predominantly obtained their tickets is summarised in Table 5-6.

Table 5-6: Ticket Purchase Results

	Category	Frequency	Percent
Ticket Purchase	Season ticket holder	87	18.8
	Given tickets	51	11.0
	Given corporate tickets	68	14.7
	Purchase prior to each match	250	54.1
	Other	6	1.3
	Total	462	100.0

5.4 Assessment of the Data Set

The data set collected from respondents was tested in order to determine whether the statistical assumptions for factor analysis and multiple regression analysis had been met.

5.4.1 Statistical Assumptions for Factor Analysis

As discussed in Section 4.6.1.3, if the statistical assumptions of normality, homoscedasticity and linearity for factor analysis are not met, the observed correlations between variables may be diminished. When the data matrix has sufficient correlations, the potential effect of violations of these assumptions is minimised, and the use of factor analysis is justified. The data matrix was therefore tested for sufficient correlations by examining the correlation matrix, inspecting the anti-image correlation matrix, conducting Bartlett's test of sphericity and assessing the Kaiser-Meyer-Olkin measure of sampling adequacy.

5.4.1.1 Examination of the Correlation Matrix

The correlation matrix (Appendix 3) shows that there are many substantial correlations above .30 as recommended by Hair et al. (1998). This indicates that the items share common factors and are therefore suitable for factor analysis.

5.4.1.2 Inspection of the Anti-Image Correlation Matrix

The anti-image correlation matrix (Appendix 4), which represents the negative value of the partial correlations, shows that the majority of the off diagonal values were low. This indicates that the correlation matrix was appropriate for use in factor analysis.

5.4.1.3 Bartlett's Test of Sphericity

Bartlett's test of sphericity was conducted in order to assess whether the correlation matrix came from a population of variables that were independent[33]. The test value was large (10853.41) and the level of significance low (0.000). The null hypothesis was therefore rejected, indicating that the data are appropriate for factor analysis.

5.4.1.4 The Kaiser-Meyer-Olkin Measure of Sampling Adequacy

The Kaiser-Meyer-Olkin measure was also applied. In the index range from 0 to 1, the test statistic was 0.930. Kaiser and Rice (1974, cited in Stewart, 1981) defined this value

[33] The null hypothesis.

(.90+) as 'marvellous', indicating that the variables belonged together, and were appropriate for factor analysis.

5.4.2 Factor Analysis Results

Since the assumptions of factor analysis had been met, principal components factor analysis was conducted on all of the items perceived by the focus group participants as subdimensions. The following sections summarise the key results.

5.4.2.1 The Roots Criterion

Results of the latent root criterion[34] indicated that 11 dimensions should be extracted from the 48 variables submitted for factor analysis (Appendix 5). These 11 dimensions explained 63.70% of the variation in the data.

5.4.2.2 The Scree Test

By laying a straight edge across the bottom portion of the roots, the point at which the factors curve above the straight line indicated that the extraction of 11 dimensions was suitable for this analysis.

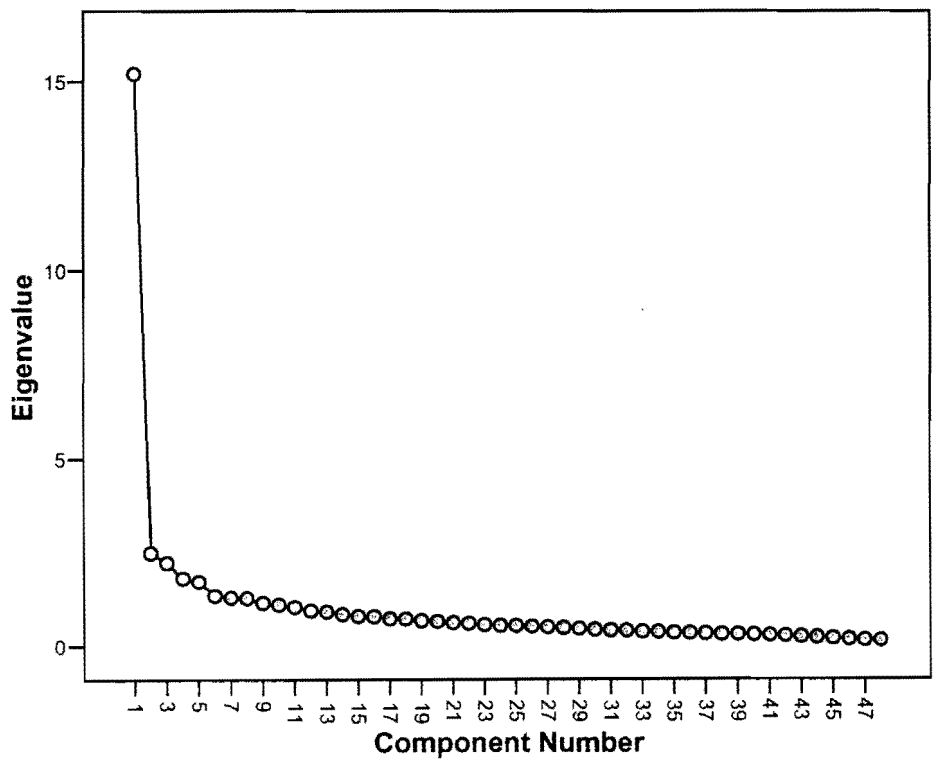

Figure 5-1: The Scree Plot

[34] Where the eigenvalues are greater than 1.

5.4.2.3 Rotation Results

Both the VARIMAX and the oblique rotations (Appendix 6) displayed similar factor loadings, with the exception of item A2. This item had significant loadings on two dimensions, and the significance of the loadings changed between rotations. The loadings also changed the order of C6 and C11, and B8 and B9 within its dimension, however this did not alter the structure of the dimensions.

5.4.2.4 Factor Interpretation

All of the items subjected to factor analysis had significant loadings above $\pm .30$. Twelve variables had significant loadings on two factors. The remaining 36 variables loaded cleanly on one factor. It was therefore deemed by the researcher that these loadings were sufficiently minimal, and that interpretation of the factors could proceed.

Each factor was subsequently named (see Appendix 7 for details of the variable loadings). The 11 factors were; Visuals and Sound, Security Employees, Seating, Cleanliness, Food and Beverage, Access, Players, Game Quality, Entertainment, Social Factors, and Atmosphere.

5.4.3 Assessment of Summated Scales

Before summation of the items, the content validity, dimensionality and reliability of the scales were assessed.

5.4.3.1 Content Validity

Each of the variables for each factor were inspected by the researcher to ensure that they 'looked right'. The majority of the variables loaded under the predicted subdimension with the exception of the Food and Beverage factor. Rather than Quality of Food and Drinks, and the Range of Food and Drinks variables loading as an outcome factor, and Efficiency and Speed of Food and Beverage Workers variables loading as an interaction factor, they combined to form one dimension. Based on the findings from the focus groups and the literature review, the remaining variables loaded as predicted. It was therefore concluded that they exhibited adequate content validity.

5.4.3.2 Dimensionality

As noted in Section 5.4.2.4, 12 of the variables loaded on more than one factor. Most of these loadings occurred with the variables that were not highly correlated with each

factor. Therefore, in order to increase the unidimensionality of the scaled items, only the variables that loaded above ±.50 were included to represent each factor. From the total of 48 items subjected to factor analysis, 11 items were excluded, leaving 37 variables to represent the eleven factors.

5.4.3.3 Reliability

All of the remaining items were then subjected to reliability tests. Reliability was measured with Cronbach's Coefficient Alpha. For all of the factors, the scores were above 0.60, as recommended by Churchill (1979). The variables used in the summated scale are summarised in Tables 5-7, 5-8, and 5-9.

Table 5-7: Reliability of Scaled Items for Interaction Quality

Dimension	Cronbach Alpha	Item No.	Items	Rotation Loading
Security Employees	0.829	a5	Courteousness of Security	0.82
		a3	Helpfulness of Security	0.79
		a8	Knowledge of Security	0.59
		a6	Security Help with Seating	0.59
		a1	Security Control of Disorderly Behaviour	0.53
Food and Beverage	0.838	c9	Quality of Food and Drinks	0.77
		c5	Range of Food and Drinks	0.73
		a9	Efficiency of F&B Workers	0.73
		a4	Speed of F&B Workers	0.61
Players	0.622	a13	Player Acknowledgement	0.80
		a7	Player Interaction	0.75

Table 5-8: Reliability of Scaled Items for Physical Environment Quality

Dimension	Cronbach Alpha	Item No.	Items	Rotation Loading
Visuals and Sound	0.654	b6	Big Screen	0.65
		b7	Sound Systems	0.63
		b14	Scoreboards	0.62
Seating	0.843	b11	Spaciousness of Seating	0.78
		b10	Comfort of Seating	0.78
		b12	Access to Seating	0.61
Cleanliness	0.707	b1	Cleanliness of Stadium	-0.65
		b18	Cleanliness of Toilets	-0.51
		b2	Access to Amenities	-0.46
Access	0.835	b15	Closeness of Car Parking	-0.84
		b3	Reliability of Car Parking	-0.74
		b13	Security of Car Parking	-0.71
		b16	Transportation Options	-0.58
Social Factors	0.632	a10	Enforcement of Non-Smoking Policies	-0.72
		b19	Impact of other Spectators	-0.59
		b20	Interaction with other Spectators	-0.50

Table 5-9: Reliability of Scaled Items for Outcome Quality

Dimension	Cronbach Alpha	Item No.	Items	Rotation Loading
Game Quality	0.784	c15	Flow of Game	-0.64
		c8	Fairness of Officials	-0.58
		c6	Number of Tries per Game	-0.56
		c11	Speed of the Game	-0.54
Entertainment	0.765	c1	Pre-Game Entertainment	-0.77
		c7	Half-Time Entertainment	-0.70
Atmosphere	0.770	c3	Performance of Team	0.74
		c2	Exciting Games	0.63
		c12	Exciting Atmosphere	0.57
		c4	Socialisation	0.54

The Cronbach Coefficient Alpha was also used to measure the reliability of the Service Quality and Satisfaction summated scales. The alpha level for the three Service Quality items was 0.806, and 0.907 for the three Satisfaction items[35]. It was therefore concluded that both these measures demonstrated reliability.

All of the summated scales were judged to demonstrate sufficient content validity, dimensionality, and reliability for a newly developed questionnaire. The mean of each

[35] See Section D of the Questionnaire in Appendix 2 for the Service Quality and Satisfaction items.

of the scales was then used to represent each one of the dimensions in Tables 5-7, 5-8, and 5-9 for further analysis.

5.4.4 Assessment of the Regression Models

Each of the eight multiple regression models was tested for the presence of outliers, multicollinearity, linearity, and homoscedasticity, independence and normality of the error term.

5.4.4.1 Outliers

Each of the eight regression models was analysed for outlying observations. The outliers for each model were subsequently removed from the analysis, to reduce the effects of their influence.

5.4.4.2 Multicollinearity

Multicollinearity was assessed for each regression equation. Inspection of the Pearson Correlation Matrix for each equation (Appendix 8, Tables 26A – 32A) revealed that the correlations between the independent variables did not exceed 0.80. In addition, the R^2 values for each equation were not excessively high. While the F-ratio is highly significant, all of the individual t-ratios are also significant.

The VIF for each equation did not exceed 2 (Appendix 8, Table 32A), and all tolerance values were above 0.10 for each model. However, the condition indices for all of the multiple regression models did exceed 15, indicating that there was a possible problem with collinearity, but none of the condition indices exceeded 30, indicating that the problem was not serious.

A further examination of the results of the Pearson Correlation Matrix, and the multiple regression results showed that no large unexpected changes occurred in the direction and magnitude of the coefficients.

It was concluded that there was a degree of multicollinearity in each of the models (as evidenced by the condition indices), however it was not seriously impacting on any of the regression models.

5.4.4.3 Linearity and Homoscedasticity

No systematic pattern was detected in the residual scatter plots (see Appendix 9), thus providing support for the specified linear relationship. This result also provides sufficient evidence that the error terms are homoscedastic.

5.4.4.4 Independence

The Durbin Watson statistics for each of the regression equations are summarised in the following table.

Table 5-10: Durbin-Watson Test Statistics

Model	Dependent Variable	Durbin-Watson	Test Statistic (at .01)	
			DL	DU
1	Interation Quality	2.038	1.460	1.630
2	Physical Environment Quality	2.067	1.440	1.650
3	Outcome Quality	2.075	1.460	1.630
4	Service Quality	2.125	1.460	1.630
5	Value	2.146	1.520	1.560
6	Satisfaction	2.113	1.480	1.600
7	Recommend Service	2.118	1.500	1.580
8	Future Attendance	2.080	1.500	1.580

Each Durbin-Watson statistic was greater than the DU. It was concluded that there was no autocorrelation in the residuals, and that they displayed independence. The assumption of independence was therefore satisfied.

5.4.4.5 Normality

The histogram of the residuals for each regression equation (Appendix 10, Figure 9A) show that the histogram and the normal plot are similar. Likewise, the points on the normal P-P plot of regression standardised residuals (Appendix 10, Figure 10A) do not exhibit substantial discrepancy from the superimposed straight line. Thus, it was concluded that the residuals were approximately normally distributed.

5.5 Results Pertaining to Research Objective 1 (Hypothesis 1 through 6)

This section presents the results relating to Hypotheses 1 through 6 in order to satisfy Research Objective 1. For Hypotheses 1, 2 and 3, the summated scaled dimensions (as presented in Tables 5-7, 5-8, and 5-9) were regressed against the primary dimension they were related to, as perceived by the focus group participants, and the researcher.

Two dimensions contained items from two primary dimensions; Food and Beverage, and Social Factors. These were included in the two related multiple regression equations. Hypotheses 4, 5, and 6 were tested with a single multiple regression model.

5.5.1 Hypothesis 1

The results relating to Hypothesis 1 are presented in Table 5-11. The independent variables of Security Employees, Food and Beverage, Social Factors, and Players were regressed against the primary dimension of Interaction Quality.

Table 5-11: Model 1: Multiple Regression Results Relating to Hypothesis 1

Model	Variable	Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	0.759	0.203		3.743	0.000
	security_emp	0.536	0.040	0.499	13.403	0.000
	f_and_b	0.209	0.029	0.252	7.135	0.000
	social_factors	0.106	0.032	0.115	3.291	0.001
	players	0.083	0.026	0.107	3.233	0.001
Adjusted R Square = 0.575; F = 154.398*						

The F-test of the regression shows that there is sufficient evidence (significant at $p<0.01$) to substantiate the model's usefulness in predicting perceived interaction quality. The coefficient of determination (R^2) of the regression reveals that 57.5% of the variation in interaction quality is explained by the regression model. The p-values show that all of the independent variables were significant at the 1% level.

As indicated in Table 5-11, the subdimensions of Security Employees, Food and Beverage, and Players, all positively affected interaction quality perceptions. In addition, Social Factors also had a positive affect. Therefore, Hypothesis 1 is supported by the statistical results.

5.5.2 Hypothesis 2

The results pertaining to Hypothesis 2 are presented in Table 5-12. As Social Factors contained items that were perceived to relate to both Interaction Quality and Physical Environment Quality, Social Factors was included in Model 2. Visuals and Sound, Access, Seating, and Cleanliness are the remaining independent variables that were regressed against the primary dimension, Physical Environment Quality.

Table 5-12: Model 2: Multiple Regression Results Relating to Hypothesis 2

Model	Variable	Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta	t	Sig.
2	(Constant)	1.060	0.245		4.327	0.000
	social_factors	0.286	0.041	0.290	6.968	0.000
	visual_sound	0.197	0.038	0.208	5.218	0.000
	access	0.125	0.033	0.158	3.759	0.000
	seating	0.112	0.035	0.142	3.238	0.001
	cleanliness	0.160	0.052	0.138	3.092	0.002
Adjusted R Square = 0.494; F = 88.444*						

The F-test is significant at .01 and the coefficient of determination (Adjusted R^2) shows that 49% of the variation in physical environment quality is explained by the regression model. The p-values reveal that all of the independent variables were significant at the 1% level.

The subdimensions of Social Factors, Visuals and Sound, Access, Seats, and Cleanliness all positively affected the Physical Environment Quality primary dimension, as seen in Table 5-12. The results of the statistical analysis support Hypothesis 2.

5.5.3 Hypothesis 3

Hypothesis 3 was tested in Model 3. The results are presented in Table 5-13. As Food and Beverage contained items that were perceived to be both Interaction Quality items, and Outcome items, Food and Beverage was included in the model. Atmosphere, Game Quality, and Entertainment are the remaining independent variables regressed against the primary dimension of Outcome Quality.

Table 5-13: Model 3: Multiple Regression Results Relating to Hypothesis 3

Model	Variable	Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta	t	Sig.
3	(Constant)	0.396	0.249		1.590	0.113
	atmosphere	0.667	0.052	0.531	12.786	0.000
	game_qual	0.208	0.047	0.186	4.438	0.000
	entertainment	0.078	0.027	0.114	2.914	0.004
	f_and_b	0.027	0.029	0.036	0.935	0.350
Adjusted R Square = 0.540; F = 131.633*						

The results in Table 5-13 indicate that Atmosphere, Game Quality, and Entertainment are significant at $p<.01$. The Food and Beverage dimension however, is not significant.

Additionally, the F-test in Model 3 is significant ($p<.01$), and the adjusted R^2 for the regression is 54%, indicating that 54% of the variation in the dependent variable can be explained by the independent variables.

The subdimensions of Atmosphere, Game Quality, and Entertainment all positively affected the Outcome Quality primary dimension, as shown in Table 5-13. The Food and Beverage subdimension was not significant for this sample. Therefore, Hypothesis 3 is only partially supported by the statistical results.

5.5.4 Hypotheses 4, 5, and 6

The results of Model 4 relating to Research Objective 1, and to Hypotheses 4, 5, 6, and 12d are presented in Table 5-14. The primary dimensions of Interaction Quality, Physical Environment Quality, and Outcome Quality were regressed against Service Quality. Also, to test the effects of Fanship (Hypothesis 12), it was included in Model 4.

Table 5-14: Model 4: Multiple Regression Results Relating to Hypotheses 4, 5, 6, and 12d

Model	Variable	Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta	t	Sig.
4	(Constant)	1.177	0.187		6.281	0.000
	Interaction_qual	0.227	0.030	0.269	7.465	0.000
	PE_Qual	0.156	0.028	0.222	5.638	0.000
	Outcome_qual	0.324	0.034	0.381	9.505	0.000
	Fanship	0.074	0.017	0.140	4.389	0.000
Adjusted R Square = 0.568; F = 149.979*						

Each of the independent variables for Model 4 is significant at 1%. The F-test of the regression revealed that there was sufficient evidence to substantiate the model's usefulness in predicting service quality. The adjusted R^2 revealed that 56.8% of the variation in service quality was explained by the model.

The primary dimensions of Interaction Quality, Physical Environment Quality, and Outcome Quality all positively affected perceived Service Quality, as shown in Table 5-14. Support for the intent of Hypotheses 4, 5, and 6 was therefore found, based on the statistical results.

5.5.5 Discussion Regarding Research Objective 1

There are 11 subdimensions of service quality as perceived by spectators of professional sport. These are Security Employees, Food and Beverage, Players, Social Factors,

Visuals and Sound, Access, Seats, Cleanliness, Atmosphere, Game Quality, and Entertainment. Two subdimensions contained items[36] categorised with more than one primary dimension – Social Factors, and Food and Beverage. Social Factors had a significant affect on both Interaction Quality, and Physical Environment Quality. This finding suggests that increases in the Social Factors subdimension will positively effect both the Interaction and Outcome primary dimensions. Food and Beverage had a significant affect on Interaction Quality, but not on Outcome Quality.

The support found for Hypotheses 4, 5, and 6 provides further evidence for the use of the primary dimensions of Interaction Quality, Physical Environment Quality, and Outcome Quality as broad dimensions of service quality for a spectator sport.

Further, the results of Hypotheses 1 through 6 suggest that there is support for a hierarchical factor structure for professional sport.

5.6 Results Pertaining to Research Objectives 2 and 3 (Hypotheses 7 through 12)

This section presents the results relating to Hypotheses 7 through 12, to satisfy both Research Objective 2 and Research Objective 3.

5.6.1 Hypothesis 7

Hypothesis 7 was tested using multiple regression Model 5. The results are presented in Table 5-15.

Table 5-15: Model 5: Regression Results Relating to Hypotheses 7

Model	Variable	Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta	t	Sig.
5	(Constant)	1.267	0.210		6.022	0.000
	ser_qual	0.829	0.037	0.729	22.408	0.000
Adjusted R Square = 0.530; F = 502.109*						

Service Quality is statistically significant at 1%, as shown in Table 5-15. In addition, this one explanatory variable accounted for an adjusted R^2 of 0.530, explaining 53% of the variation in the perceptions of value. The F-test is also highly significant. Service

[36] As perceived by the focus group participants.

Quality perceptions therefore had a positive affect on perceptions of Value, supporting the intent of Hypothesis 7.

5.6.2 Hypotheses 8 and 9

Satisfaction is hypothesised to be influenced by perceptions of Value (Hypothesis 8), perceptions of Service Quality (Hypothesis 9), and Fanship (Hypothesis 12c). These were tested using multiple regression Model 6. The results are presented in Table 5-16.

Table 5-16: Model 6: Multiple Regression Results Relating to Hypotheses 8, 9, and 12c

Model	Variable	Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta	t	Sig.
6	(Constant)	1.323	0.120		11.020	0.000
	ser_qual	0.550	0.027	0.603	20.299	0.000
	Fanship	0.030	0.011	0.063	2.724	0.007
	Value	0.241	0.020	0.342	11.773	0.000
Adjusted R Square = 0.779; F = 532.730*						

Each of the independent variables was significant at 1%. The adjusted R^2 reveals that 77.9% of the variation in satisfaction was explained by the predictor variables. In addition, the F-test is highly significant.

The findings support Hypothesis 8, suggesting that perceptions of Value will positively affect Satisfaction. Additionally, Service Quality perceptions had a positive affect on Satisfaction, providing support for Hypothesis 9.

5.6.3 Hypothesis 10

The intention to Recommend (attending professional sport as a spectator) is hypothesised to be influenced by Satisfaction (Hypothesis 10), and Fanship (Hypothesis 12b). Multiple regression Model 7 tests these two hypotheses. The results are presented in Table 5-17.

Table 5-17: Model 7: Multiple Regression Results Relating to Hypotheses 10 and 12b

Model	Variable	Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta	t	Sig.
7	(Constant)	1.462	0.283		5.164	0.000
	satisfaction	0.635	0.049	0.505	13.073	0.000
	Fanship	0.152	0.024	0.247	6.402	0.000
Adjusted R Square = 0.389; F = 144.470*						

Both Satisfaction, and Fanship are contributing significantly to the model at the level of significance of 1%. The F-test is significant at $p<.01$, and the adjusted R^2 shows that 38.9% of the variation in the dependent variable is explained by the independent variables.

The results support Hypothesis 10, suggesting that increases in Satisfaction levels will positively affect the intention to recommend the service.

5.6.4 Hypothesis 11

The intention to Attend (future matches) is assessed using multiple regression Model 8. The results of this model, in which Satisfaction (Hypothesis 11) and Fanship (Hypothesis 12a) are regressed against Future Attendance are presented in Table 5-18.

Table 5-18: Model 8: Multiple Regression Results Relating to Hypotheses 11 and 12a

Model	Variable	Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta	t	Sig.
8	(Constant)	3.480	0.311		11.196	0.000
	satisfaction	0.314	0.053	0.263	5.873	0.000
	Fanship	0.183	0.026	0.318	7.093	0.000
Adjusted R Square = 0.218; F = 60.954*						

The F-statistic (significant at $p<0.01$) reveals that the model is sufficiently predicting intentions to attend future matches. However, the adjusted R-square shows that only 21.8% of the variation in the dependent variable is explained by the two independent variables.

Hypothesis 11 is nonetheless supported, suggesting that increases in Satisfaction will positively affect the intention to Attend future matches.

5.6.5 Hypothesis 12

Higher levels of Fanship are hypothesised to affect; the intention to Attend future matches (Hypothesis 12a), intentions to Recommend the service to others (Hypothesis 12b), perceptions of Satisfaction (Hypothesis 12c), and perceptions of Service Quality (Hypothesis 12d). Each of these hypotheses was tested in multiple regression Models 4, 6, 7, and 8 respectively. The results are presented in Tables 5-14, 5-16, 5-17, and 5-18.

Each of the statistical results supports Hypothesis 12 and Fanship was found to have a positive affect on the intention to Attend, intention to Recommend, Satisfaction, and Service Quality.

5.6.6 Discussion Regarding Research Objective 2 and 3

In addition to Service Quality being positively influenced by perceptions of the three primary dimensions, Fanship also has a significant positive affect. While Fanship has a significant positive affect (standardised coefficient of $\beta = 0.14$), it is not as important as Outcome Quality ($\beta = 0.38$), Interaction Quality ($\beta = 0.27$) or Physical Environment Quality ($\beta = 0.22$).

Increased favourable perceptions of Service Quality had a positive affect on perceptions of Value, as well as perceptions of Satisfaction. Satisfaction is also affected by increased perceptions of Value, and of Fanship.

Comparing the standardised coefficients of Service Quality, Value, and Fanship, Satisfaction is most influenced by perceptions of Service Quality ($\beta = 0.60$), followed by Value ($\beta = 0.34$) and Fanship ($\beta = 0.06$). However, service quality has both a direct effect and an indirect effect, through value, on satisfaction, and therefore the importance of service quality should be fully understood.

The intention to Recommend the service to others is positively affected by increases in Satisfaction (standardised coefficient of $\beta = 0.51$) as well as Fanship ($\beta = 0.25$). However, the results indicate that the intention to Recommend the service is influenced more strongly by Satisfaction, than by Fanship.

The intention to Attend future sporting events is similarly positively affected by increases in Satisfaction ($\beta = 0.26$), and increased levels of Fanship ($\beta = 0.32$). However, the relative importance of these constructs has changed, with Fanship being slightly more important than Satisfaction. It should be noted, however, that the adjusted

R-square values for each of these models is relatively low. The two explanatory variables are only explaining 39% and 22% respectively, leaving much of the variation in the dependent variables unexplained by the model.

5.7 Results Pertaining to Research Objective 4 (Hypothesis 13)

In order to identify the least and most important Service Quality dimensions as perceived by spectators, the multiple regression Models 1, 2, 3 and 4 were used. The results are reported in Tables 5-11, 5-12, 5-13, and 5-14.

5.7.1 Hypothesis 13

Hypothesis 13a postulated that spectators will perceive each of the primary dimensions to be more or less important, and this is supported by the statistical results. The standardised coefficients for each of the primary dimensions show that for Service Quality, Outcome Quality ($\beta = 0.38$) was perceived as the most important, followed by Interaction Quality ($\beta = 0.27$) and Physical Environment Quality ($\beta = 0.22$).

Each of the subdimensions was perceived as more or less important, supporting the intent of Hypothesis 13b. The relative importance of each of these subdimensions is shown in Figure 5-2, which lists the standardised coefficients for each of the eight regression models.

5.7.2 Discussion Regarding Research Objective 4

Each of the primary dimensions; Interaction Quality, Physical Environment Quality, and Outcome Quality vary in terms of their importance to overall Perceived Service Quality. In addition, each of the subdimensions varies in importance to each of the primary dimensions. There is a considerable difference in these, as shown in Figure 5-2.

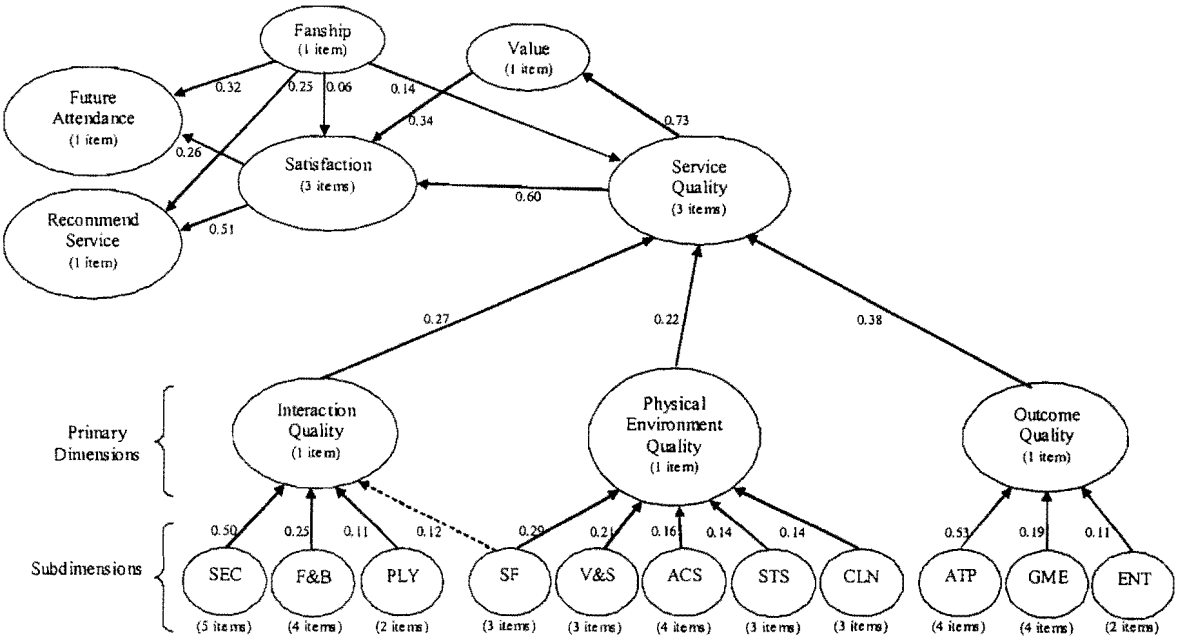

Figure 5-2: Spectator Satisfaction in Professional Sport: Path Model

Security Employees is the most important subdimension for spectators' perceptions of Interaction Quality, followed by Food and Beverage, Players, and Social Factors. For Physical Environment Quality, Social Factors is the most important subdimension, then Visuals and Sound, Access, Seats, and Cleanliness. Atmosphere is the most important Outcome Quality subdimension, followed by Game Quality, and Entertainment.

5.8 Chapter Summary

This chapter presented the results based on the research plan and methodology outlined in Chapter Four. A preliminary examination of the data set indicated that the questionnaire was both reliable and valid. In addition, examination of the data set indicated that the statistical assumptions required to perform factor analysis, and multiple regression analysis had been met.

Using principal components factor analysis, the 48 items considered by the focus group participants to be subdimensions were reduced to 11 Service Quality subdimensions. Each path in the conceptual model (presented in Chapter 3, Section 3.3) was subsequently tested using eight multiple regression models. Hypothesis 3 was partially supported, while the remaining 13 Hypotheses were supported by the statistical results. Each of the four research objectives was satisfied.

Chapter 6: Conclusions and Implications

6.1 Introduction

This chapter provides a summary of the research, reviews the findings, and reports several conclusions based on the results and discussion presented in Chapter Five. The theoretical and managerial contributions, limitations, and avenues for future research are discussed.

6.2 Summary of the Study

The findings of the literature review presented in Chapter Two, indicated that a hierarchical factor structure was appropriate for the measurement and conceptualisation of service quality for spectators of professional sports. Additionally, three primary dimensions; Interaction Quality, Physical Environment Quality, and Outcome Quality were supported by the literature review, the focus group participants, and the statistical analysis.

The three primary dimensions of service quality may be appropriate across industries and cultures, however several researchers suggest that industry specific research should be undertaken due to the inability to identify a common set of service quality subdimensions (Burton et al., 2001; Dabholkar et al., 1996; Kim & Kim, 1995; Powpaka, 1996). In agreement with these researchers, this study has identified the service quality subdimensions of Rugby Union in New Zealand as perceived by spectators.

Several constructs related to service quality were identified in the literature review. Service quality has been related to satisfaction (Brady et al., 2002; Cronin & Taylor, 1994; Parasuraman et al., 1994; Rust & Oliver, 1994) and value (Bolton & Drew, 1991; Caruana et al., 2000; Hightower et al., 2002), while favourable future intentions have been related to satisfaction (Madrigal, 1995; Swan & Trawick, 1981). In addition, fanship has been identified as an important aspect for the marketing of hedonic services, such as sporting events (Hightower et al., 2002; Laverie & Arnett, 2000; Wakefield & Blodgett, 1999). This study has analysed each of these constructs and the relationships between them.

In order to better understand spectators' perceptions of service quality, and their effects on the related constructs such as value, satisfaction, favourable behavioural intentions, and fanship, four research objectives were identified which this study sought to address:

(i) To identify the dimensions of service quality for a professional sport in New Zealand as perceived by spectators.

(ii) To determine the effects of service quality on the related constructs of satisfaction, value, and future intentions.

(iii) To identify the effects of fanship (enduring involvement) on service quality, satisfaction, and future intentions.

(iv) To identify the least, and most important service quality dimensions as perceived by spectators of a professional sport in New Zealand.

These four research objectives were addressed by testing 13 hypotheses, developed in Chapter Three. Hypotheses 1 through 6 relates to Research Objective 1, Hypotheses 7 through 11 relates to Research Objective 2, Hypothesis 12 relates to Research Objective 3, and Hypothesis 13 relates to Research Objective 4.

6.3 Conclusions Pertaining to Research Objective 1

Research Objective One was satisfied as the dimensions of service quality, as perceived by spectators of a professional sport in New Zealand, were identified. The primary dimensions of Interaction Quality, Physical Environment Quality, and Outcome Quality were supported by the literature review, the focus group research, and the statistical analysis. This finding supports Brady and Cronin's (2001) analysis, as they also determined these primary dimensions were suitable for professional sport.

Eleven subdimensions were established in the analysis. These were greater in number than those identified by Brady and Cronin (2001), and used in SPORTSERV[37] (Theodorakis & Kambitsis, 1998, cited in Theodorakis et al., 2001). The eleven subdimensions were also considerably different in content. This supports the view that the subdimensionality of the service quality construct is dependent on the service industry under investigation (Burton et al., 2001; Kim & Kim, 1995), and adds support to the claims that industry and cultural-specific measures need to be developed to

[37] SPORTSERV was conceptualised as a 1st order factor structure.

identify subdimensions (Dabholkar et al., 1996; Powpaka, 1996; Ueltschy & Krampf, 2001).

The inclusion of Physical Environment Quality provides empirical support for the studies of Wakefield and Blodgett (1994; 1996) and Hightower et al. (2002) who suggested the Servicescape was important when a service was primarily consumed for hedonic purposes. It also provides empirical evidence connecting the physical environment to constructs such as perceptions of value, service quality, and behavioural intentions, as called for by Hightower et al. (2002).

While two of the three Outcome Quality dimensions are not under the direct control of marketers (Atmosphere and Game Quality), they were found to be extremely important in understanding and measuring spectators' perceptions of service quality. The subdimensions of Atmosphere, and Game Quality support the analysis of Madrigal (2003) and Wakefield and Blodgett (1999) who suggested that it was the competitive nature of sporting events and the excitement that made them a compelling form of leisure behaviour. It also supports the findings of Owen and Weatherston (2002b), who found that 'quality of rugby' was one of the major determinants of attendance at Super 12 matches.

6.4 Conclusions Pertaining to Research Objective 2

Research Objective Two was satisfied as each of the hypothesised paths relating to value, satisfaction, and future intentions in the conceptual model were confirmed.

Service Quality explained 53% of the variation in the perceptions of Value (see Section 5.6.1), supporting the findings of Hightower et al. (2002), who determined value to be influenced by service quality. However, this result does not support the findings of Caruana et al. (2000), who determined that value did not have a strong independent effect on satisfaction. The findings of this study indicate that value does have an independent effect on satisfaction. Additionally, the findings indicate that higher perceptions of service quality will increase the perceptions of value. Service quality has both a direct effect on satisfaction, and an indirect effect through value. Additionally, service quality and value had strong independent effects on satisfaction, indicating that they were distinct constructs. These results support the findings of Bolton and Drew (1991).

The three independent variables of Value, Service Quality and Fanship explained approximately 78% of the variation in Satisfaction. The strongest independent effect

was between Service Quality and Satisfaction. This result supports the empirical findings of Brady et al. (2002) who determined that service quality was an antecedent of the superordinate satisfaction construct.

The likelihood that respondents would Recommend the service is positively influenced by increased levels of Satisfaction. In addition, Satisfaction was found to be an important predictor of the likelihood of Attending future events, as argued by Madrigal (1995). 21.8% of the variation in the dependent variable was explained by the two independent variables Satisfaction and Fanship. However, a considerable amount of the variation in the likelihood to Attend was left unexplained. The physical environment, feelings of excitement and pleasure could explain further variation in the likelihood to attend, as suggested by Wakefield and Blodgett (1999). Further, the relationship between these variables seems to be very complex, as suggested by Hightower et al. (2002).

6.5 Conclusions Pertaining to Research Objective 3

Research Objective Three was satisfied as the effects of Fanship (enduring involvement) on related service quality constructs was determined. Fanship was found to have a statistically significant effect on Service Quality, Satisfaction, and Future Intentions. The effect was minimal on Service Quality and Satisfaction when compared to the other independent variables, but it accounted for a higher percentage of the variation of the intentions to Recommend, and Attend the sporting event.

The small standardised coefficient shows that the effect of Fanship on Service Quality was minimal. Nevertheless, it can be argued that increases in levels of Fanship will increase perceptions of service quality. This may be due to a sense of loyalty to the team, and therefore a willingness to overlook certain quality failures. In addition, a better understanding of the game and of the key personalities in the team may contribute to the key Outcome Quality dimensions of Atmosphere and Game Quality, acting to influence perceptions of service quality. As suggested by Deighton (1994), by intensifying involvement with an event, an audience has a tighter sense of identification with the action. It may also be easier for a devoted fan to get 'caught up' with the emotional aspects of the event. Spectators who are not devoted fans, but who are fans of other sports, may be a lot more critical when analysing the quality of the sporting event they are attending.

Similarly, the small standardised coefficient between Fanship and Satisfaction when compared to the standardised coefficients of Value and Service Quality suggests that the impact of Fanship on Satisfaction was minimal. However, increased levels of Fanship have a direct, and indirect effect on Satisfaction levels. Fanship indirectly increases perceptions of Service Quality (as previously discussed), and there is also a small direct effect on Satisfaction. The results provide support for Madrigal's (1995) view that satisfaction with the decision to attend an event was related to a strong identification with the team[38].

Fanship accounted for a greater amount of variation in the Intention to Attend than did Satisfaction. This is not taking into account the indirect effects that Fanship had on the constructs of Service Quality and Satisfaction. This finding supports that of Laverie and Arnett (2000), who also empirically determined that identity salience with a team explained more of the variance in fan attendance than satisfaction. Understanding the levels of importance of the team to spectators appears to be critical in understanding motivations to attend games (Laverie & Arnett, 2000). This finding also provides support for Hightower et al. (2002) who suggested that involvement was an important explanatory construct for hedonic services, such as sporting events; and Owen and Weatherston (2002b) who concluded that the factors that most affected attendance reflected habit and tradition.

The Intention to Recommend the service provides greater implications for satisfaction, value, and service quality. Firstly, the adjusted R-square is higher, indicating that more of the variation in the Intention to Recommend is explained by the model than Intention to Attend. Secondly, Satisfaction explains considerably more of the variation in the Intention to Recommend than Fanship. This implies that in order to increase the intention to recommend the sporting event, spectators must first be satisfied. This finding provides further support for Laverie and Arnett (2000), that involvement, identification and satisfaction are related to future fan behaviours.

6.6 Conclusions Pertaining to Research Objective 4

Research Objective Four was satisfied as the least and most important service quality dimensions of a professional sport in New Zealand as perceived by spectators were identified.

[38] Madrigal (1995) also cited post-game affect, pre-game expectations regarding a team's performance, and the quality of the opponent to influence satisfaction with the decision to attend.

The primary dimension Outcome Quality was perceived by spectators as most important, followed by Interaction Quality, and Physical Environment Quality. This finding supports that of Wakefield and Blodgett (1996) that intangible service quality factors, such as Outcome Quality and Interaction Quality, were the predominant factors in determining service quality perceptions. Further, it supports Kelly and Turley's (2001) analysis that the most important service attribute was game experience. While the Physical Environment was not the most important primary dimension in this study, it does provide empirical support for the importance of the physical environment in the consumption of leisure services as called for by Hightower et al. (2002).

Also, each of the subdimensions varied considerably in terms of their importance to the three primary dimensions (see Figure 5-2).

6.7 Contributions

Satisfying the four research objectives of this study makes several contributions to the theoretical understanding of professional sport.

6.7.1 Theoretical Implications

The results of the analysis justified the call for industry and culturally specific service quality measures. They also support the use of hierarchical factor structures, such as those developed by Dabholkar et al. (1996) and Brady and Cronin (2001). However, it should be noted that the three primary dimensions and the subdimensions may not be generic for all service industries and cultures. For example, rugby union as opposed to baseball, and New Zealand as opposed to North America. Dimensional structures should be confirmed through the use of an appropriate qualitative or quantitative analysis.

The study also provides a framework for understanding the effects of the three primary dimensions on the service constructs service quality, perceptions of value, satisfaction, and behavioural intentions. Also, Fanship was identified as an important predictor variable for numerous constructs, especially behavioural intentions.

6.7.2 Managerial Implications

In relation to Research Objective 1, the results of this study indicate to management that there are three primary dimensions of service quality, and that each of these primary dimensions has subdimensions. Further, while the primary dimensions may be appropriate for use across a range of industries and cultures, managers should note that

the results of this study do provide support the use of specific measures of service quality, in particular on a subdimensional level.

The findings regarding Research Objective 2 help managers to understand the effects of the related constructs of Satisfaction, Value, and Future Intentions. The relationships hypothesised from the literature, were supported by the statistical analysis. Managers should develop an understanding of these relationships, and strive to create favourable behavioural intentions. To achieve this goal, managers should endeavour to increase favourable word of mouth and increase the levels of satisfaction through increased service quality perceptions, and increased perceptions of value.

In relation to Research Objective 3, this study provides managers with a greater understanding of how important Fanship is to Service Quality, Satisfaction, and Behavioural Intentions. In particular, managers should increase the level of involvement with their team and they should improve efforts to target to those fans who are less knowledgeable about the sporting event, in order to increase future attendance intentions (Hightower et al., 2002). This is particularly important as the results indicate that the majority of spectators are not season ticket holders, but that they purchase tickets prior to each match.

Furthermore, the results relating to Research Objective 4 indicate that managers should be aware of the importance placed on each of the primary dimensions, and on each of the subdimensions. As Outcome Quality is the most important primary dimension for favourable perceptions of service quality, an important aspect of the quality of service is not under the control of marketers (Kelly & Turley, 2001). Managers should promote factors that are likely to increase the atmosphere of a sporting event; such as ensuring the teams perform well, and playing games against closely matched teams. In addition, as Security Employees are important for perceptions of Interaction Quality, particular attention should be paid to their attitudes and behaviours. Similarly, controlling and creating the Social Environment should be a priority for managers, in order to increase perceptions of Interaction and Physical Environment Quality.

6.8 Limitations

While this study provides a number of important contributions to the theory and for management, there are also some key limitations.

Firstly, there are aspects of the sampling method that limit the generalisability of the results. Data were collected on only one occasion, and the home team won the game[39]. In addition, Canterbury spectators are well known to be particularly parochial in their support for Rugby Union. Additionally, the perceptions of the non-respondents are unknown.

Secondly, there are some limitations of the questionnaire. Single item measures were used to measure Fanship, Value and Future Intentions and each of the primary dimensions. The focus group analysis, the literature search, and the pre-testing procedures were thorough; however, some key items may not have been included in the questionnaire.

Third, the standardised coefficients are comparable against those in the same multiple regression model, but not against each other. Comparisons could not be made against the independent variables from different multiple regression models.

Lastly, this study analysed spectators' general perceptions. It did not attempt to determine how these change in terms of their importance, as performance changes[40].

6.9 Avenues for Future Research

A number of avenues for future research have emerged:

- A further reduction of the service quality subdimensions identified in this study may be necessary to provide an even more concise set of service quality subdimensions.
- The use of multi item measures on all constructs may improve any further analysis.
- An improved understanding of the Fanship construct may assist managers to devise appropriate strategies for increasing desired outcomes.
- Further research into what motivates spectators' intention to attend future matches should be undertaken.

[39] 80.5% of respondents supported the home team.

[40] Swan and Combs (1976) divided attributes for products into determinant attributes (those that are important to consumers and are variable across alternatives) and instrumental attributes (those dimensions that are important, and must reach a certain minimum level). They concluded that instrumental requirements must be satisfied before satisfaction from determinant attributes can occur (Swan & Combs, 1976).

- Future studies could analyse the changes in importance of dimensions as their performance changes. For example, a longitudinal study over the length of a season may provide more information on the influence of the home team's win/loss record, and on additional factors, such as weather, closeness of the game, and quality of the opposition. The current study attempted to explain the general perceptions of spectators, but these will undoubtedly be influenced by these factors.
- Future studies could incorporate statistical techniques such as structural equation modelling to confirm the model developed in this study and compare the respective coefficients.

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Appendices

Appendix 1: Questionnaire

No.:

A SURVEY OF SPECTATORS' PERCEPTIONS OF SERVICE QUALITY FOR SUPER 12 RUGBY

Only those 18 years or older are asked to complete the questionnaire

QUESTIONNAIRE

This questionnaire contains 5 sections (A - E). Please answer all the questions in each section.

Below are a series of statements that relate to your **overall experiences** at Super 12 Matches in the 2003 and 2004 seasons. This means that you should answer based on how you generally feel about the Super 12, rather than on one particular match.

Please indicate how strongly you agree or disagree with each of the following statements on a scale of 1 to 7. 1 you strongly disagree, 7 you strongly agree and 4 is neutral. If you are unable to answer a question, use the neutral value of 4 on the scale.

Section A: Interaction Quality

		Strongly Disagree			Neutral			Strongly Agree
1	Security staff adequately control disorderly behaviour.....	1	2	3	4	5	6	7
2	Tickets are efficiently collected.....	1	2	3	4	5	6	7
3	Security staff are willing to help you.....	1	2	3	4	5	6	7
4	Food and beverage workers are concerned with giving fast service..	1	2	3	4	5	6	7
5	Security staff are courteous.....	1	2	3	4	5	6	7
6	Security staff allow you to get to your seat quickly.....	1	2	3	4	5	6	7
7	Players are willing to interact with the crowd after the match.....	1	2	3	4	5	6	7
8	Security staff are able to answer questions.....	1	2	3	4	5	6	7
9	Food and beverage workers are efficient.....	1	2	3	4	5	6	7
10	Security staff enforce non-smoking policies.....	1	2	3	4	5	6	7
11	Security staff make you feel safe during the game.....	1	2	3	4	5	6	7
12	Ticket collectors are courteous.....	1	2	3	4	5	6	7
13	Players acknowledge crowd support.....	1	2	3	4	5	6	7
14	Overall, the quality of the interactions with all employees involved in the Super 12 is excellent.....	1	2	3	4	5	6	7

Please turn the page and complete Section B.

Section B: Physical Environment Quality

		Strongly Disagree			Neutral			Strongly Agree
1	The stadium is clean	1	2	3	4	5	6	7
2	The stadium's design allows fast access to amenities (such as toilets and food and beverage services)	1	2	3	4	5	6	7
3	I can reliably get a car park	1	2	3	4	5	6	7
4	The stadium's physical facilities are visually appealing	1	2	3	4	5	6	7
5	My view of the game is good, given the price I paid for the ticket	1	2	3	4	5	6	7
6	I can easily see replays of the game on the 'big screen'	1	2	3	4	5	6	7
7	Sound systems are of high quality	1	2	3	4	5	6	7
8	The stadium design enables me to feel involved in the match	1	2	3	4	5	6	7
9	Shelter from weather extremes is adequate	1	2	3	4	5	6	7
10	The seats are comfortable	1	2	3	4	5	6	7
11	I generally have enough space around me	1	2	3	4	5	6	7
12	The stadium's layout makes it easy to get to and from my seat	1	2	3	4	5	6	7
13	Car parking is secure	1	2	3	4	5	6	7
14	Scoreboards are of high quality	1	2	3	4	5	6	7
15	Car parking is adequately close to the stadium	1	2	3	4	5	6	7
16	Transportation options to the stadium are adequate	1	2	3	4	5	6	7
17	You feel safe walking to and from the stadium	1	2	3	4	5	6	7
18	The toilets are clean	1	2	3	4	5	6	7
19	Other spectators do not affect my ability to enjoy a quality Super 12 match experience	1	2	3	4	5	6	7
20	The stadium's layout allows for suitable interaction with other spectators	1	2	3	4	5	6	7
21	The design of the physical environment for the Super 12 is excellent	1	2	3	4	5	6	7

Please turn the page and complete Section C and Section D.

Section C: Outcome Quality

		Strongly Disagree			Neutral			Strongly Agree
1	Pre game entertainment is enjoyable.....	1	2	3	4	5	6	7
2	The games are usually exciting.....	1	2	3	4	5	6	7
3	The team I support typically performs well in the competition.....	1	2	3	4	5	6	7
4	I am able to socialise with my friends at games.....	1	2	3	4	5	6	7
5	I like the range of food and drinks.....	1	2	3	4	5	6	7
6	I am generally satisfied with the number of tries scored in a game...	1	2	3	4	5	6	7
7	Half time entertainment is enjoyable.....	1	2	3	4	5	6	7
8	Match officials are normally equitable in decisions.....	1	2	3	4	5	6	7
9	Food and drinks are of good quality.....	1	2	3	4	5	6	7
10	Players display sportsmanship during and after the match.....	1	2	3	4	5	6	7
11	The games are usually fast and flowing.....	1	2	3	4	5	6	7
12	The atmosphere is exciting.....	1	2	3	4	5	6	7
13	I am kept entertained throughout the whole experience.....	1	2	3	4	5	6	7
14	Match programs are informative.....	1	2	3	4	5	6	7
15	Match officials generally allow the game to flow.....	1	2	3	4	5	6	7
16	Going to a Super 12 Match at Jade Stadium is always an excellent experience.....	1	2	3	4	5	6	7

Section D: Service Quality and Satisfaction

		Strongly Disagree			Neutral			Strongly Agree
1	The service quality of the Super 12 is excellent.....	1	2	3	4	5	6	7
2	The quality of the Super 12 could be considered superior when compared to other spectator sports.....	1	2	3	4	5	6	7
3	Attending a Super 12 match is usually a satisfying experience.....	1	2	3	4	5	6	7
4	Overall, I am satisfied with my decision to attend Super 12 matches.....	1	2	3	4	5	6	7
5	Considering the whole experience, I would consider the Super 12 good value for money.....	1	2	3	4	5	6	7
		Very Dissatisfied						Very Satisfied
6	My feelings toward the Super 12 can best be characterised as.....	1	2	3	4	5	6	7
		Poor						Excellent
7	Overall, I thought that the quality of the Super 12 was.....	1	2	3	4	5	6	7

Please turn the page and complete Section E.

Section E: Demographics and Behavioural Questions

1 What is your gender? Male ☐ Female ☐

2 What age group are you in? 18-25 ☐ 26-35 ☐ 36-45 ☐
46-55 ☐ 56-65 ☐ 65 + ☐

3 What is your ethnicity? NZ European ☐ NZ Maori ☐ Pacific Islander ☐
European ☐ Asian ☐
Other (please specify)_____

4 What is your occupation? Clerical ☐ Sales/Service ☐ Student ☐
Professional ☐ Tradesperson ☐ Unemployed ☐
Labourer ☐ Farmer ☐
Other (please specify)_____

5 How many Super 12 matches did you attend in 2003? _____ 2004? _____

6 Which team do you normally support? _____

7 Please indicate how you normally obtain your tickets?
Season ticket holder ☐ Given tickets ☐ Given Corporate tickets ☐
Purchase prior to each match ☐ Other (please specify)_____

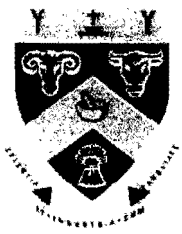
		Highly Unlikely						Highly Likely
8	How likely are you to attend another Super 12 match?.....	1	2	3	4	5	6	7
9	How likely are you to recommend others to attend a Super 12 match?.....	1	2	3	4	5	6	7

		Casual Follower						Avid Fan
10	On a scale of 1 – 7, would you consider yourself a casual follower (1) or an avid fan (7) of Super 12 Rugby?.....	1	2	3	4	5	6	7

Thank you for your help in this research. Please return the survey in the prepaid envelope by the 7th of April 2004.

Appendix 2: Cover Letter

LINCOLN
UNIVERSITY
Te Whare Wānaka O Aoraki



Commerce Division
P O Box 84
Lincoln University
Canterbury
New Zealand
Telephone:
(64)(3) 325 2811

25 March, 2004

Dear Spectator,

Thank-you for agreeing to participate in this survey. It constitutes part of a Master of Commerce and Management thesis at Lincoln University. The purpose of this research is to identify the factors that spectators use in evaluating the quality of the Super 12 service experience.

By answering this questionnaire you will contribute to an understanding of spectator's views on Super 12 Rugby and how organisers can better serve them, as well as contributing to the academic literature on service quality. This survey will take approximately 10 minutes to complete.

In addition, by completing the competition entry form, you will be **entered into a draw to win $200 cash**. To be eligible for the draw, please ensure that you complete and **return the questionnaire** in the pre-paid envelope **by the 7th of April 2004**. The winner will be drawn randomly on Friday the 9th of April 2004 and contacted immediately.

Complete confidentiality is assured in this study, as the questionnaire is anonymous. The entry form for the cash draw will be separated from the survey when received, and once the draw has taken place all contact details will be securely destroyed.

If you have any questions about this survey, please contact me on (03) 325 3838 extension 8384, or by email at collinm2@lincoln.ac.nz. My research supervisors are listed below, should you need to contact them for any reason. Thank you for your co-operation and assistance.

Best regards,

Mark Collins
Commerce Division

Research Supervisors:

Michael D. Clemes
Senior Lecturer
Commerce Division
Lincoln University

Dr. Lucie Ozanne
Management Department
Private Bag 4800
University of Canterbury

• THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY LINCOLN UNIVERSITY HUMAN ETHICS COMMITTEE •

Appendix 3: Correlation Matrix

Table 19A: The Correlation Matrix

	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	b1	b2	b3
a1	1.00	0 37	0 41	0 31	0.46	0 44	0 13	0 31	0 20	0.32	0.52	0 32	0.15	0 31	0.25	0.25
a2	0 37	1.00	0 34	0 33	0.36	0 40	0.09	0.25	0 37	0.17	0.39	0 51	0.19	0 42	0.38	0.29
a3	0 41	0 34	1.00	0 35	0 66	0 50	0 24	0 55	0 30	0.22	0 44	0.39	0 19	0.26	0 30	0.27
a4	0 31	0.33	0.35	1 00	0 37	0.35	0 16	0.35	0.74	0.25	0 36	0.35	0.18	0 29	0 27	0.24
a5	0 46	0 36	0.66	0.37	1.00	0.58	0.19	0.54	0.33	0.24	0.53	0.51	0.16	0.26	0.31	0 31
a6	0 44	0 40	0.50	0 35	0.58	1.00	0.21	0.43	0.31	0 26	0.49	0.47	0.28	0.35	0.41	0.26
a7	0 13	0 09	0.24	0 16	0 19	0.21	1.00	0.32	0.15	0.16	0.23	0 18	0.46	0.07	0 18	0 23
a8	0 31	0.25	0 55	0.35	0.54	0.43	0.32	1 00	0.37	0.25	0.43	0.34	0 26	0.23	0.29	0.28
a9	0.20	0 37	0 30	0.74	0.33	0.31	0.15	0 37	1.00	0.18	0.38	0.40	0.20	0.30	0.33	0 26
a10	0 32	0.17	0 22	0 25	0.24	0.26	0.16	0 25	0.18	1.00	0 46	0.24	0.23	0.21	0.17	0.20
a11	0 52	0 39	0 44	0 36	0.53	0.49	0 23	0 43	0 38	0.46	1.00	0.52	0.24	0.37	0 35	0.34
a12	0 32	0.51	0 39	0.35	0 51	0 47	0.18	0 34	0.40	0.24	0.52	1 00	0 19	0.40	0 43	0.31
a13	0 15	0 19	0 19	0 18	0 16	0.28	0 46	0.26	0.20	0.23	0 24	0 19	1 00	0 16	0 16	0.24
b1	0.31	0 42	0.26	0.29	0 26	0.35	0 07	0.23	0.30	0.21	0 37	0 40	0.16	1 00	0 57	0 33
b2	0 25	0.38	0 30	0.27	0.31	0.41	0.18	0.29	0.33	0.17	0.35	0 43	0.16	0 57	1.00	0.32
b3	0.25	0.29	0.27	0.24	0.31	0.26	0.23	0.28	0.26	0.20	0.34	0 31	0.24	0.33	0.32	1.00
b4	0 29	0.32	0 28	0.32	0.27	0.32	0 18	0.30	0.23	0 18	0 38	0.34	0.16	0.40	0.38	0.41
b5	0 21	0 26	0.24	0.23	0.26	0.34	0.09	0.22	0 21	0.18	0 31	0.30	0 13	0.40	0.40	0.31
b6	0 26	0.19	0.15	0.19	0.24	0 24	0.10	0.20	0.16	0.16	0.23	0 28	0.22	0.26	0.27	0.27
b7	0.21	0 21	0 19	0 24	0.23	0.24	0 11	0.20	0.21	0 21	0.28	0.21	0.22	0.22	0 22	0 17
b8	0.32	0.26	0 30	0.33	0.36	0.29	0 25	0 28	0 27	0.22	0.39	0 36	0 21	0.33	0 34	0.31
b9	0 26	0 14	0.25	0.20	0.25	0.24	0 15	0.30	0.17	0.17	0.28	0.24	0.19	0.24	0.25	0.37
b10	0.13	0.22	0.19	0.19	0.20	0.25	0.17	0.23	0.19	0.17	0.27	0.31	0.19	0.34	0 38	0.34
b11	0.20	0.28	0.21	0.20	0.27	0.32	0.14	0.25	0.21	0.22	0 41	0.37	0 17	0.38	0.41	0.36
b12	0.27	0 31	0.23	0.22	0 31	0.39	0.15	0.27	0.20	0.25	0.38	0.36	0.20	0 37	0.48	0.40
b13	0.20	0.23	0.22	0.18	0.26	0.24	0.18	0.28	0.26	0.19	0.33	0 27	0.22	0.24	0 27	0.55
b14	0 30	0 28	0.28	0.24	0.27	0.30	0.16	0.24	0.18	0.21	0.33	0.24	0.21	0.24	0.31	0.24
b15	0 17	0 23	0.23	0.17	0.22	0.28	0.23	0.27	0.20	0.15	0.31	0.22	0.23	0.27	0.27	0.73
b16	0.22	0.25	0.23	0.27	0.22	0 26	0.12	0.28	0.27	0.16	0 32	0.24	0 24	0.29	0.30	0.40
b17	0.22	0 25	0.18	0.22	0.23	0.25	0.14	0.26	0.24	0.13	0.28	0.28	0.20	0.37	0.29	0.34
b18	0.24	0.27	0 23	0.27	0.25	0.27	0.10	0.20	0.29	0.23	0 34	0.34	0.16	0.45	0.42	0.26
b19	0 29	0.28	0 20	0 18	0.24	0.21	0 12	0.19	0.17	0.29	0.31	0.27	0.17	0.39	0.29	0.33
b20	0.30	0.27	0 28	0.24	0.31	0.34	0.21	0.26	0.22	0.29	0.35	0.32	0.26	0.39	0.34	0.37
c1	0.21	0 27	0.24	0.34	0.24	0.32	0.25	0.26	0.30	0.16	0.32	0.28	0.22	0.25	0.24	0.21
c2	0 29	0.32	0.24	0.31	0.29	0.34	0.15	0.25	0.27	0.21	0.32	0.38	0.25	0.37	0.34	0.30
c3	0.17	0.25	0.13	0.19	0.20	0.23	0.10	0.14	0.18	0.19	0.22	0.28	0.19	0.22	0 22	0 25
c4	0 19	0.25	0.17	0.22	0.24	0.24	0.14	0.18	0.25	0.17	0.28	0.35	0.19	0.31	0.31	0.29
c5	0.26	0 34	0.24	0.40	0.26	0.29	0 15	0.21	0.47	0 17	0.40	0.33	0.19	0.26	0.36	0.26
c6	0.27	0.24	0 24	0.23	0.28	0.34	0.06	0.20	0.26	0.19	0.34	0.31	0.17	0.27	0.24	0.24
c7	0.26	0.27	0.29	0.31	0.30	0.35	0.28	0.35	0.27	0.21	0 39	0.27	0.25	0.27	0.31	0.28
c8	0.28	0.24	0 20	0.23	0.25	0.25	0.15	0 24	0.19	0.22	0 32	0.25	0.14	0.15	0.24	0.28
c9	0.24	0.33	0.26	0.48	0.30	0.33	0.12	0.26	0.53	0.17	0 41	0.39	0.22	0.29	0.37	0.25
c10	0.28	0 23	0.22	0.28	0.27	0.38	0.29	0.31	0.30	0.23	0.39	0.32	0 41	0.26	0.29	0.30
c11	0.27	0 25	0 19	0.23	0.23	0.32	0.14	0.20	0.20	0.22	0 32	0.29	0.29	0.33	0.33	0.26
c12	0.25	0.38	0.29	0.29	0.35	0.30	0.14	0.23	0.31	0.22	0.39	0.37	0.25	0.33	0.30	0.36
c13	0 28	0.33	0.23	0.36	0.32	0.27	0.18	0.23	0.29	0.18	0.37	0.34	0.22	0.31	0.27	0.38
c14	0.20	0.25	0 28	0.29	0.28	0.30	0.09	0.31	0.29	0.26	0.35	0.30	0.24	0.25	0.34	0.17
c15	0.35	0.31	0 21	0.27	0 30	0.33	0.14	0.25	0.29	0.26	0 46	0.32	0.23	0.29	0.32	0.31

	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15	b16	b17	b18	b19
a1	0.29	0.21	0.26	0.21	0.32	0.26	0.13	0.20	0.27	0.20	0.30	0.17	0.22	0.22	0.24	0.29
a2	0.32	0.26	0.19	0.21	0.26	0.14	0.22	0.28	0.31	0.23	0.28	0.23	0.25	0.25	0.27	0.28
a3	0.28	0.24	0.15	0.19	0.30	0.25	0.19	0.21	0.23	0.22	0.28	0.23	0.23	0.18	0.23	0.20
a4	0.32	0.23	0.19	0.24	0.33	0.20	0.19	0.20	0.22	0.18	0.24	0.17	0.27	0.22	0.27	0.18
a5	0.27	0.26	0.24	0.23	0.36	0.25	0.20	0.27	0.31	0.26	0.27	0.22	0.22	0.23	0.25	0.24
a6	0.32	0.34	0.24	0.24	0.29	0.24	0.25	0.32	0.39	0.24	0.30	0.28	0.26	0.25	0.27	0.21
a7	0.18	0.09	0.10	0.11	0.25	0.15	0.17	0.14	0.15	0.18	0.16	0.23	0.12	0.14	0.10	0.12
a8	0.30	0.22	0.20	0.20	0.28	0.30	0.23	0.25	0.27	0.28	0.24	0.27	0.28	0.26	0.20	0.19
a9	0.23	0.21	0.16	0.21	0.27	0.17	0.19	0.21	0.20	0.26	0.18	0.20	0.27	0.24	0.29	0.17
a10	0.18	0.18	0.16	0.21	0.22	0.17	0.17	0.22	0.25	0.19	0.21	0.15	0.16	0.13	0.23	0.29
a11	0.38	0.31	0.23	0.28	0.39	0.28	0.27	0.41	0.38	0.33	0.33	0.31	0.32	0.28	0.34	0.31
a12	0.34	0.30	0.28	0.21	0.36	0.24	0.31	0.37	0.36	0.27	0.24	0.22	0.24	0.28	0.34	0.27
a13	0.16	0.13	0.22	0.22	0.21	0.19	0.19	0.17	0.20	0.22	0.21	0.23	0.24	0.20	0.16	0.17
b1	0.40	0.40	0.26	0.22	0.33	0.24	0.34	0.38	0.37	0.24	0.24	0.27	0.29	0.37	0.45	0.39
b2	0.38	0.40	0.27	0.22	0.34	0.25	0.38	0.41	0.48	0.27	0.31	0.27	0.30	0.29	0.42	0.29
b3	0.41	0.31	0.27	0.17	0.31	0.37	0.34	0.36	0.40	0.55	0.24	0.73	0.40	0.34	0.26	0.33
b4	1.00	0.44	0.31	0.25	0.49	0.38	0.35	0.39	0.38	0.33	0.37	0.39	0.36	0.36	0.38	0.32
b5	0.44	1.00	0.33	0.26	0.46	0.31	0.39	0.43	0.40	0.23	0.30	0.28	0.25	0.29	0.38	0.36
b6	0.31	0.33	1.00	0.34	0.43	0.33	0.21	0.28	0.32	0.21	0.46	0.26	0.23	0.30	0.32	0.29
b7	0.25	0.26	0.34	1.00	0.45	0.24	0.19	0.19	0.22	0.25	0.37	0.23	0.23	0.26	0.26	0.19
b8	0.49	0.46	0.43	0.45	1.00	0.40	0.33	0.37	0.39	0.27	0.39	0.35	0.33	0.33	0.32	0.39
b9	0.38	0.31	0.33	0.24	0.40	1.00	0.36	0.32	0.33	0.34	0.39	0.40	0.35	0.34	0.25	0.33
b10	0.35	0.39	0.21	0.19	0.33	0.36	1.00	0.72	0.56	0.37	0.25	0.37	0.30	0.25	0.38	0.27
b11	0.39	0.43	0.28	0.19	0.37	0.32	0.72	1.00	0.65	0.40	0.28	0.36	0.31	0.32	0.40	0.37
b12	0.38	0.40	0.32	0.22	0.39	0.33	0.56	0.65	1.00	0.44	0.37	0.38	0.40	0.37	0.40	0.37
b13	0.33	0.23	0.21	0.25	0.27	0.34	0.37	0.40	0.44	1.00	0.29	0.64	0.45	0.37	0.26	0.26
b14	0.37	0.30	0.46	0.37	0.39	0.39	0.25	0.28	0.37	0.29	1.00	0.36	0.38	0.37	0.35	0.26
b15	0.39	0.28	0.26	0.23	0.35	0.40	0.37	0.36	0.38	0.64	0.36	1.00	0.56	0.43	0.31	0.35
b16	0.36	0.25	0.23	0.23	0.33	0.35	0.30	0.31	0.40	0.45	0.38	0.56	1.00	0.46	0.32	0.38
b17	0.36	0.29	0.30	0.26	0.33	0.34	0.25	0.32	0.37	0.37	0.37	0.43	0.46	1.00	0.44	0.37
b18	0.38	0.38	0.32	0.26	0.32	0.25	0.38	0.40	0.40	0.26	0.35	0.31	0.32	0.44	1.00	0.43
b19	0.32	0.36	0.29	0.19	0.39	0.33	0.27	0.37	0.37	0.26	0.26	0.35	0.38	0.37	0.43	1.00
b20	0.44	0.37	0.29	0.33	0.47	0.36	0.31	0.36	0.45	0.37	0.33	0.39	0.43	0.44	0.42	0.62
c1	0.35	0.24	0.22	0.29	0.33	0.20	0.28	0.28	0.25	0.24	0.32	0.21	0.22	0.23	0.26	0.24
c2	0.42	0.42	0.37	0.27	0.50	0.22	0.26	0.32	0.39	0.23	0.34	0.22	0.31	0.37	0.36	0.35
c3	0.29	0.31	0.20	0.13	0.30	0.17	0.13	0.18	0.21	0.17	0.20	0.20	0.19	0.21	0.23	0.23
c4	0.33	0.36	0.20	0.29	0.43	0.32	0.29	0.32	0.36	0.27	0.32	0.28	0.35	0.29	0.30	0.35
c5	0.34	0.27	0.19	0.25	0.33	0.20	0.36	0.39	0.36	0.37	0.27	0.27	0.35	0.18	0.30	0.27
c6	0.27	0.30	0.28	0.24	0.32	0.21	0.21	0.26	0.27	0.24	0.34	0.27	0.24	0.34	0.30	0.29
c7	0.46	0.26	0.23	0.31	0.42	0.33	0.30	0.31	0.31	0.34	0.40	0.36	0.40	0.27	0.31	0.31
c8	0.30	0.20	0.23	0.23	0.32	0.30	0.25	0.32	0.28	0.27	0.34	0.30	0.27	0.24	0.27	0.27
c9	0.36	0.27	0.18	0.27	0.31	0.17	0.32	0.35	0.34	0.33	0.28	0.23	0.34	0.18	0.34	0.23
c10	0.29	0.29	0.31	0.27	0.34	0.31	0.24	0.27	0.28	0.26	0.36	0.28	0.30	0.28	0.29	0.29
c11	0.36	0.33	0.34	0.24	0.40	0.25	0.27	0.24	0.31	0.21	0.36	0.27	0.32	0.33	0.37	0.31
c12	0.42	0.39	0.33	0.29	0.53	0.24	0.26	0.27	0.30	0.27	0.34	0.32	0.35	0.32	0.37	0.37
c13	0.44	0.35	0.32	0.27	0.48	0.28	0.26	0.27	0.29	0.28	0.33	0.34	0.35	0.37	0.34	0.39
c14	0.29	0.25	0.24	0.26	0.31	0.21	0.17	0.19	0.25	0.16	0.32	0.17	0.29	0.19	0.26	0.22
c15	0.31	0.30	0.33	0.26	0.36	0.33	0.30	0.30	0.27	0.29	0.38	0.31	0.34	0.32	0.36	0.32

	b20	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	c12	c13	c14	c15
a1	0.30	0.21	0.29	0.17	0.19	0.26	0.27	0.26	0.28	0.24	0.28	0.27	0.25	0.28	0.20	0.35
a2	0.27	0.27	0.32	0.25	0.25	0.34	0.24	0.27	0.24	0.33	0.23	0.25	0.38	0.33	0.25	0.31
a3	0.28	0.24	0.24	0.13	0.17	0.24	0.24	0.29	0.20	0.26	0.22	0.19	0.29	0.23	0.28	0.21
a4	0.24	0.34	0.31	0.19	0.22	0.40	0.23	0.31	0.23	0.48	0.28	0.23	0.29	0.36	0.29	0.27
a5	0.31	0.24	0.29	0.20	0.24	0.26	0.28	0.30	0.25	0.30	0.27	0.23	0.35	0.32	0.28	0.30
a6	0.34	0.32	0.34	0.23	0.24	0.29	0.34	0.35	0.25	0.33	0.38	0.32	0.30	0.27	0.30	0.33
a7	0.21	0.25	0.15	0.10	0.14	0.15	0.06	0.28	0.15	0.12	0.29	0.14	0.14	0.18	0.09	0.14
a8	0.26	0.26	0.25	0.14	0.18	0.21	0.20	0.35	0.24	0.26	0.31	0.20	0.23	0.23	0.31	0.25
a9	0.22	0.30	0.27	0.18	0.25	0.47	0.26	0.27	0.19	0.53	0.30	0.20	0.31	0.29	0.29	0.29
a10	0.29	0.16	0.21	0.19	0.17	0.17	0.19	0.21	0.22	0.17	0.23	0.22	0.22	0.18	0.26	0.26
a11	0.35	0.32	0.32	0.22	0.28	0.40	0.34	0.39	0.32	0.41	0.39	0.32	0.39	0.37	0.35	0.46
a12	0.32	0.28	0.38	0.28	0.35	0.33	0.31	0.27	0.25	0.39	0.32	0.29	0.37	0.34	0.30	0.32
a13	0.26	0.22	0.25	0.19	0.19	0.19	0.17	0.25	0.14	0.22	0.41	0.29	0.25	0.22	0.24	0.23
b1	0.39	0.25	0.37	0.22	0.31	0.26	0.27	0.27	0.15	0.29	0.26	0.33	0.33	0.31	0.25	0.29
b2	0.34	0.24	0.34	0.22	0.31	0.36	0.24	0.31	0.24	0.37	0.29	0.33	0.30	0.27	0.34	0.32
b3	0.37	0.21	0.30	0.25	0.29	0.26	0.24	0.28	0.28	0.25	0.30	0.26	0.36	0.38	0.17	0.31
b4	0.44	0.35	0.42	0.29	0.33	0.34	0.27	0.46	0.30	0.36	0.29	0.36	0.42	0.44	0.29	0.31
b5	0.37	0.24	0.42	0.31	0.36	0.27	0.30	0.26	0.20	0.27	0.29	0.33	0.39	0.35	0.25	0.30
b6	0.29	0.22	0.37	0.20	0.20	0.19	0.28	0.23	0.23	0.18	0.31	0.34	0.33	0.32	0.24	0.33
b7	0.33	0.29	0.27	0.13	0.29	0.25	0.24	0.31	0.23	0.27	0.27	0.24	0.29	0.27	0.26	0.26
b8	0.47	0.33	0.50	0.30	0.43	0.33	0.32	0.42	0.32	0.31	0.34	0.40	0.53	0.48	0.31	0.36
b9	0.36	0.20	0.22	0.17	0.32	0.20	0.21	0.33	0.30	0.17	0.31	0.25	0.24	0.28	0.21	0.33
b10	0.31	0.28	0.26	0.13	0.29	0.36	0.21	0.30	0.25	0.32	0.24	0.27	0.26	0.26	0.17	0.30
b11	0.36	0.28	0.32	0.18	0.32	0.39	0.26	0.31	0.32	0.35	0.27	0.24	0.27	0.27	0.19	0.30
b12	0.45	0.25	0.39	0.21	0.36	0.36	0.27	0.31	0.28	0.34	0.28	0.31	0.30	0.29	0.25	0.27
b13	0.37	0.24	0.23	0.17	0.27	0.37	0.24	0.34	0.27	0.33	0.26	0.21	0.27	0.28	0.16	0.29
b14	0.33	0.32	0.34	0.20	0.32	0.27	0.34	0.40	0.34	0.28	0.36	0.36	0.34	0.33	0.32	0.38
b15	0.39	0.21	0.22	0.20	0.28	0.27	0.27	0.36	0.30	0.23	0.28	0.27	0.32	0.34	0.17	0.31
b16	0.43	0.22	0.31	0.19	0.35	0.35	0.24	0.40	0.27	0.34	0.30	0.32	0.35	0.35	0.29	0.34
b17	0.44	0.23	0.37	0.21	0.29	0.18	0.34	0.27	0.24	0.18	0.28	0.33	0.32	0.37	0.19	0.32
b18	0.42	0.26	0.36	0.23	0.30	0.30	0.30	0.31	0.27	0.34	0.29	0.37	0.37	0.34	0.26	0.36
b19	0.62	0.24	0.35	0.23	0.35	0.27	0.29	0.31	0.27	0.23	0.29	0.31	0.37	0.39	0.22	0.32
b20	1.00	0.30	0.41	0.24	0.45	0.27	0.32	0.37	0.27	0.27	0.31	0.37	0.44	0.43	0.31	0.35
c1	0.30	1.00	0.32	0.22	0.21	0.31	0.20	0.62	0.34	0.36	0.28	0.23	0.32	0.39	0.29	0.27
c2	0.41	0.32	1.00	0.55	0.46	0.27	0.46	0.35	0.32	0.30	0.45	0.63	0.60	0.56	0.40	0.42
c3	0.24	0.22	0.55	1.00	0.40	0.20	0.35	0.24	0.25	0.22	0.32	0.40	0.45	0.41	0.28	0.28
c4	0.45	0.21	0.46	0.40	1.00	0.37	0.33	0.27	0.22	0.33	0.30	0.32	0.36	0.34	0.30	0.28
c5	0.27	0.31	0.27	0.20	0.37	1.00	0.33	0.41	0.27	0.80	0.27	0.20	0.29	0.34	0.35	0.38
c6	0.32	0.20	0.46	0.35	0.33	0.33	1.00	0.30	0.40	0.31	0.41	0.54	0.40	0.38	0.27	0.49
c7	0.37	0.62	0.35	0.24	0.27	0.41	0.30	1.00	0.40	0.46	0.33	0.35	0.38	0.48	0.37	0.38
c8	0.27	0.34	0.32	0.25	0.22	0.27	0.40	0.40	1.00	0.29	0.37	0.41	0.32	0.42	0.21	0.51
c9	0.27	0.36	0.30	0.22	0.33	0.80	0.31	0.46	0.29	1.00	0.29	0.26	0.30	0.29	0.38	0.34
c10	0.31	0.28	0.45	0.32	0.30	0.27	0.41	0.33	0.37	0.29	1.00	0.49	0.40	0.38	0.33	0.50
c11	0.37	0.23	0.63	0.40	0.32	0.20	0.54	0.35	0.41	0.26	0.49	1.00	0.61	0.51	0.34	0.56
c12	0.44	0.32	0.60	0.45	0.36	0.29	0.40	0.38	0.32	0.30	0.40	0.61	1.00	0.71	0.34	0.49
c13	0.43	0.39	0.56	0.41	0.34	0.34	0.38	0.48	0.42	0.29	0.38	0.51	0.71	1.00	0.34	0.52
c14	0.31	0.29	0.40	0.28	0.30	0.35	0.27	0.37	0.21	0.38	0.33	0.34	0.34	0.34	1.00	0.37
c15	0.35	0.27	0.42	0.28	0.28	0.38	0.49	0.38	0.51	0.34	0.50	0.56	0.49	0.52	0.37	1.00

Appendix 4: Anti-Image Correlation Matrix

Table 20A: The Anti-Image Correlation Matrix

	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	b1	b2	b3
a1	0.93	-0 15	-0 09	-0.11	-0.09	-0 13	0 02	0.02	0 13	-0.07	-0.25	0 09	0.04	-0.08	0 04	-0.06
a2	-0 15	0 94	-0 07	0 02	0.02	-0 06	0 07	0 02	-0.12	0 06	0.02	-0.27	-0.09	-0 15	-0 04	-0.02
a3	-0 09	-0 07	0 92	-0 06	-0 37	-0.08	-0 06	-0 25	0.05	0 02	0 00	-0.01	-0 01	-0 02	-0 04	-0.02
a4	-0.11	0 02	-0.06	0.88	-0 07	-0.04	-0.02	0 03	-0 64	-0.15	0 09	0.04	0.04	-0 03	0 08	-0.04
a5	-0 09	0 02	-0 37	-0.07	0 92	-0.27	0 03	-0.19	0 04	0 07	-0 14	-0.16	0 07	0 09	0.02	-0.12
a6	-0 13	-0 06	-0 08	-0.04	-0 27	0.94	0 02	-0.02	0 02	-0.02	-0.04	-0 10	-0.11	-0.03	-0.10	0.15
a7	0 02	0 07	-0 06	-0 02	0.03	0 02	0.82	-0 15	0.02	-0 02	-0.05	-0.05	-0 38	0.10	-0 11	-0.06
a8	0 02	0 02	-0 25	0 03	-0 19	-0 02	-0 15	0 94	-0 16	-0 05	-0.06	0 05	-0.02	0.01	-0.02	0 03
a9	0 13	-0.12	0.05	-0.64	0 04	0 02	0.02	-0.16	0 87	0.07	-0.08	-0 06	-0 01	-0.01	-0.10	-0.02
a10	-0.07	0 06	0 02	-0.15	0 07	-0.02	-0.02	-0.05	0.07	0.90	-0.30	-0.01	-0.09	-0.01	0.06	-0 06
a11	-0 25	0 02	0 00	0 09	-0 14	-0.04	-0.05	-0.06	-0.08	-0.30	0.94	-0.18	0.03	-0 07	0.05	0.01
a12	0.09	-0 27	-0 01	0 04	-0 16	-0 10	-0.05	0.05	-0 06	-0 01	-0.18	0 95	0.05	-0.02	-0.09	-0.03
a13	0.04	-0.09	-0 01	0.04	0.07	-0 11	-0.38	-0 02	-0.01	-0.09	0 03	0.05	0 89	-0 02	0.09	-0 04
b1	-0 08	-0.15	-0 02	-0 03	0.09	-0 03	0 10	0 01	-0.01	-0.01	-0.07	-0.02	-0.02	0.94	-0.35	-0.08
b2	0 04	-0.04	-0 04	0 08	0 02	-0 10	-0.11	-0.02	-0 10	0.06	0.05	-0 09	0 09	-0.35	0 94	-0.06
b3	-0.06	-0 02	-0 02	-0.04	-0.12	0.15	-0.06	0.03	-0.02	-0.06	0.01	-0.03	-0.04	-0.08	-0.06	0 90
b4	0.00	-0.06	0.00	-0.12	0.10	-0 03	0 00	-0.07	0.16	0.05	-0.06	-0.01	0.07	-0 07	-0.03	-0 11
b5	0.05	0.01	-0 03	0 01	0 03	-0.11	0.04	-0.01	0.01	0.00	-0.01	0.06	0.06	-0.05	-0.08	-0.04
b6	-0 08	0.07	0.11	0 02	-0.05	0.01	0.05	-0.05	0.00	0.02	0 11	-0.10	-0.10	0.00	-0 02	-0 08
b7	0 03	-0.06	0.01	-0 02	-0.01	-0 02	0.08	0.00	0.02	-0 08	-0.03	0.06	-0.07	-0.02	0.00	0.05
b8	-0 08	0 08	0 00	-0 06	-0.10	0.13	-0 14	0.04	-0 01	0 03	-0.03	-0.05	0.05	-0.02	0.00	0.15
b9	-0.06	0 11	-0.06	-0.01	0 03	0.01	0 08	-0.07	-0.03	0 03	0 01	-0.04	-0.04	0 01	0 02	-0.08
b10	0 02	0.02	-0.01	0 00	-0 01	0.06	-0.05	-0 04	0.02	-0.05	0.17	-0.07	-0.02	-0.06	-0.02	0.03
b11	0.08	0.00	0.02	0.01	0.02	-0 02	0.05	-0.01	0 03	0.04	-0 20	-0.01	-0.02	-0.04	0.01	-0.01
b12	0 00	-0.06	0 08	-0.02	-0.03	-0 12	0 02	0.00	0.08	-0.06	-0.02	0 02	0.02	0 08	-0.19	-0.10
b13	-0 03	0.03	0.02	0.11	-0.07	0 10	0.03	-0.05	-0 09	-0.07	0.02	-0 04	-0.03	0.01	0 02	-0.08
b14	-0 04	-0.11	-0 09	-0.05	0.00	0.04	-0 03	0.06	0.08	-0.04	-0.02	0.09	0.03	0 07	-0 05	0.15
b15	0.11	-0.02	-0 02	0.03	0.12	-0.20	-0.05	0.00	0 02	0 08	-0.05	0.08	0.03	0.05	0 04	-0 58
b16	0 00	0.02	-0 02	-0.07	0.03	0.03	0.11	-0.05	0.00	0.04	-0.02	0.01	-0.07	-0 01	-0.01	0 10
b17	-0.01	-0 01	0.07	0.03	-0 02	0.03	-0.04	-0.07	-0 07	0 06	0 02	-0.03	-0.02	-0.10	0.03	0 04
b18	0.00	0 07	-0.04	0.00	-0.02	0.07	0.02	0.06	-0 07	-0.05	-0.01	-0.05	0.01	-0 11	-0.08	0 12
b19	-0 05	-0.09	0 01	0.04	-0.04	0.11	0.03	0.00	0 04	-0 14	0.05	0.01	0.02	-0.10	0.02	0 00
b20	-0 03	0.06	-0.03	0.03	-0.01	-0.09	-0 07	0.04	-0.02	-0.05	0 05	0.02	-0.04	-0.02	0.02	-0 01
c1	0.03	-0 02	-0 01	-0.06	0.06	-0.10	-0.06	0.04	-0.06	0.05	-0.04	-0.02	-0.01	-0.03	0 06	-0.01
c2	-0.05	-0.01	-0 03	-0.03	0.07	-0.05	0.00	-0 05	0.02	0.01	0.09	-0 03	0.03	-0 02	0.04	-0.07
c3	0.01	-0 06	0.07	0 02	-0 04	0.00	0.00	0 02	0.02	-0 10	0.05	-0.02	-0.04	0.02	-0.02	-0.02
c4	0.04	0 03	0.06	0 03	-0 03	0.04	-0 02	0 02	-0 02	0.03	0 02	-0.12	-0.01	-0 03	-0 01	-0.04
c5	-0.08	-0.10	-0.04	0 05	0.06	0.00	-0.09	0.09	-0.09	-0.01	-0.02	0.11	0.03	0.07	-0.06	0.06
c6	0.01	0.08	-0.07	0 04	-0.01	-0.07	0 10	0 03	-0.07	0 03	-0.02	-0.06	0.03	-0.03	0 09	0.02
c7	0 01	0.01	0.00	0.04	0 00	-0.03	-0.09	-0.09	0.07	-0.01	-0.02	0.07	0.01	0.01	-0.03	0.06
c8	-0.06	-0.05	-0.01	0.00	0 00	0.04	0 00	-0.05	0.03	-0.07	0.06	0.00	0.08	0 14	-0 06	-0.01
c9	0 04	0.07	0.04	-0.11	-0 03	0.00	0.10	0.01	-0.11	0 09	-0.06	-0.12	-0.08	-0 02	0 01	-0.05
c10	-0.01	0.08	0 06	0.00	0.05	-0.12	-0.11	-0 05	-0.07	0.05	-0.06	-0 03	-0.19	0.01	0.00	-0.04
c11	-0.03	0.04	0.03	-0.02	0 04	-0.03	-0.01	0 03	0.06	-0.02	0 01	0.04	-0 09	-0.05	-0.07	0 08
c12	0.11	-0.12	-0.10	0 12	-0 05	0 04	0.08	0 04	-0.11	-0.03	-0.05	0.01	-0.03	0.04	0.02	-0.07
c13	-0 01	0 01	0.08	-0.18	-0.06	0.07	-0.04	0.03	0.08	0.10	-0.03	-0.04	0.00	-0.02	0.05	-0.05
c14	0.08	0.02	-0.05	0 00	0 01	0.02	0.13	-0.11	0.01	-0 11	-0.04	-0.03	-0.08	0.02	-0.12	0.05
c15	-0 05	-0 06	0.09	0 04	-0.02	-0 02	0.01	0.00	-0.01	-0 02	-0.14	0.04	0.03	0.02	-0.04	-0.05

	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15	b16	b17	b18	b19
a1	0.00	0.05	-0.08	0.03	-0.08	-0.06	0.02	0.08	0.00	-0.03	-0.04	0.11	0.00	-0.01	0.00	-0.05
a2	-0.06	0.01	0.07	-0.06	0.08	0.11	0.02	0.00	-0.06	0.03	-0.11	-0.02	0.02	-0.01	0.07	-0.09
a3	0.00	-0.03	0.11	0.01	0.00	-0.06	-0.01	0.02	0.08	0.02	-0.09	-0.02	-0.02	0.07	-0.04	0.01
a4	-0.12	0.01	0.02	-0.02	-0.06	-0.01	0.00	0.01	-0.02	0.11	-0.05	0.03	-0.07	0.03	0.00	0.04
a5	0.10	0.03	-0.05	-0.01	-0.10	0.03	-0.01	0.02	-0.03	-0.07	0.00	0.12	0.03	-0.02	-0.02	-0.04
a6	-0.03	-0.11	0.01	-0.02	0.13	0.01	0.06	-0.02	-0.12	0.10	0.04	-0.20	0.03	0.03	0.07	0.11
a7	0.00	0.04	0.05	0.08	-0.14	0.08	-0.05	0.05	0.02	0.03	-0.03	-0.05	0.11	-0.04	0.02	0.03
a8	-0.07	-0.01	-0.05	0.00	0.04	-0.07	-0.04	-0.01	0.00	-0.05	0.06	0.00	-0.05	-0.07	0.06	0.00
a9	0.16	0.01	0.00	0.02	-0.01	-0.03	0.02	0.03	0.08	-0.09	0.08	0.02	0.00	-0.07	-0.07	0.04
a10	0.05	0.00	0.02	-0.08	0.03	0.03	-0.05	0.04	-0.06	-0.07	-0.04	0.08	0.04	0.06	-0.05	-0.14
a11	-0.06	-0.01	0.11	-0.03	-0.03	0.01	0.17	-0.20	-0.02	0.02	-0.02	-0.05	-0.02	0.02	-0.01	0.05
a12	-0.01	0.06	-0.10	0.06	-0.05	-0.04	-0.07	-0.01	0.02	-0.04	0.09	0.08	0.01	-0.03	-0.05	0.01
a13	0.07	0.06	-0.10	-0.07	0.05	-0.04	-0.02	-0.02	0.02	-0.03	0.03	0.03	-0.07	-0.02	0.01	0.02
b1	-0.07	-0.05	0.00	-0.02	-0.02	0.01	-0.06	-0.04	0.08	0.01	0.07	0.05	-0.01	-0.10	-0.11	-0.10
b2	-0.03	-0.08	-0.02	0.00	0.00	0.02	-0.02	0.01	-0.19	0.02	-0.05	0.04	-0.01	0.03	-0.08	0.02
b3	-0.11	-0.04	-0.08	0.05	0.15	-0.08	0.03	-0.01	-0.10	-0.08	0.15	-0.58	0.10	0.04	0.12	0.00
b4	0.96	-0.12	0.00	0.07	-0.15	-0.11	0.01	-0.05	0.05	-0.01	-0.06	0.01	-0.01	-0.05	-0.07	0.11
b5	-0.12	0.97	-0.06	-0.02	-0.13	-0.04	-0.08	-0.07	-0.01	0.02	-0.01	0.02	0.05	0.02	-0.07	-0.08
b6	0.00	-0.06	0.93	-0.12	-0.15	-0.09	0.10	-0.07	-0.04	0.02	-0.27	0.01	0.03	0.01	-0.06	-0.06
b7	0.07	-0.02	-0.12	0.94	-0.24	0.01	-0.03	0.06	0.06	-0.08	-0.09	-0.01	0.04	-0.05	-0.04	0.11
b8	-0.15	-0.13	-0.15	-0.24	0.94	-0.11	0.01	-0.04	-0.06	0.09	0.03	-0.15	0.04	0.02	0.12	-0.03
b9	-0.11	-0.04	-0.09	0.01	-0.11	0.94	-0.17	0.06	0.00	-0.05	-0.13	0.00	-0.01	-0.09	0.07	-0.09
b10	0.01	-0.08	0.10	-0.03	0.01	-0.17	0.90	-0.52	-0.13	0.02	0.04	-0.11	-0.01	0.10	-0.09	0.10
b11	-0.05	-0.07	-0.07	0.06	-0.04	0.06	-0.52	0.91	-0.29	-0.06	0.03	0.03	0.06	-0.06	-0.02	-0.12
b12	0.05	-0.01	-0.04	0.06	-0.06	0.00	-0.13	-0.29	0.95	-0.13	-0.10	0.10	-0.11	-0.05	-0.05	0.02
b13	-0.01	0.02	0.02	-0.08	0.09	-0.05	0.02	-0.06	-0.13	0.94	0.02	-0.33	-0.04	-0.07	0.06	0.10
b14	-0.06	-0.01	-0.27	-0.09	0.03	-0.13	0.04	0.03	-0.10	0.02	0.94	-0.13	-0.07	-0.08	-0.06	0.07
b15	0.01	0.02	0.01	-0.01	-0.15	0.00	-0.11	0.03	0.10	-0.33	-0.13	0.87	-0.29	-0.08	-0.10	-0.07
b16	-0.01	0.05	0.03	0.04	0.04	-0.01	-0.01	0.06	-0.11	-0.04	-0.07	-0.29	0.95	-0.19	0.06	-0.09
b17	-0.05	0.02	0.01	-0.05	0.02	-0.09	0.10	-0.06	-0.05	-0.07	-0.08	-0.08	-0.19	0.95	-0.19	-0.01
b18	-0.07	-0.07	-0.06	-0.04	0.12	0.07	-0.09	-0.02	-0.05	0.06	-0.06	-0.10	0.06	-0.19	0.96	-0.14
b19	0.11	-0.08	-0.06	0.11	-0.03	-0.09	0.10	-0.12	0.02	0.10	0.07	-0.07	-0.09	-0.01	-0.14	0.92
b20	-0.12	0.01	0.05	-0.10	-0.07	-0.01	0.01	0.05	-0.13	-0.09	0.04	0.03	-0.06	-0.08	-0.05	-0.41
c1	-0.01	-0.01	-0.05	-0.06	0.02	0.09	-0.11	0.01	0.04	-0.05	-0.07	0.07	0.10	-0.04	0.02	-0.03
c2	-0.03	-0.05	-0.07	0.01	-0.12	0.11	0.04	-0.04	-0.10	-0.03	0.01	0.15	-0.03	-0.09	0.01	-0.02
c3	-0.03	-0.07	0.03	0.08	0.03	-0.04	0.07	0.00	0.03	0.01	0.05	-0.05	0.04	0.02	-0.01	0.03
c4	0.04	-0.06	0.14	-0.09	-0.10	-0.11	0.00	-0.01	-0.01	0.02	-0.11	0.02	-0.08	0.03	0.00	-0.01
c5	-0.04	0.02	-0.03	0.01	-0.03	0.01	-0.06	-0.08	-0.02	-0.12	0.05	0.00	-0.05	0.08	0.03	-0.07
c6	0.04	-0.03	-0.02	-0.03	0.04	0.07	0.04	-0.02	0.01	0.01	-0.08	-0.06	0.12	-0.13	0.04	-0.04
c7	-0.11	0.07	0.09	-0.03	-0.07	-0.10	0.03	0.00	0.01	-0.03	-0.06	-0.06	-0.12	0.07	-0.02	-0.03
c8	-0.01	0.08	0.06	-0.04	-0.03	-0.07	0.07	-0.15	0.00	0.00	-0.04	-0.04	-0.01	0.05	-0.01	-0.02
c9	-0.06	-0.02	0.03	-0.05	0.03	0.09	-0.02	0.04	-0.01	-0.02	-0.04	0.08	-0.04	0.04	-0.08	0.02
c10	0.01	-0.03	0.00	-0.05	0.02	-0.06	0.02	-0.01	0.03	-0.02	-0.08	0.04	-0.03	0.04	-0.01	-0.06
c11	-0.04	0.03	-0.03	0.05	0.01	0.01	-0.12	0.12	-0.04	0.01	0.01	-0.03	-0.03	0.01	-0.05	0.03
c12	-0.02	-0.03	0.00	0.00	-0.19	0.07	0.00	0.00	0.06	-0.02	-0.03	0.03	-0.06	0.07	-0.05	0.01
c13	-0.05	-0.02	-0.02	0.01	0.02	0.02	-0.02	0.06	0.01	0.03	0.04	-0.01	0.03	-0.09	0.02	-0.06
c14	0.00	0.02	-0.01	-0.03	0.01	-0.01	0.04	0.03	0.00	0.09	-0.07	-0.02	-0.04	0.05	0.02	0.04
c15	0.09	-0.02	-0.05	0.02	0.01	-0.08	-0.09	0.03	0.13	-0.01	-0.04	0.04	-0.04	-0.02	-0.06	0.03

	b20	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	c12	c13	c14	c15
a1	-0.03	0.03	-0.05	0.01	0.04	-0.08	0.01	0.01	-0.06	0.04	-0.01	-0.03	0.11	-0.01	0.08	-0.05
a2	0.06	-0.02	-0.01	-0.06	0.03	-0.10	0.08	0.01	-0.05	0.07	0.08	0.04	-0.12	0.01	0.02	-0.06
a3	-0.03	-0.01	-0.03	0.07	0.06	-0.04	-0.07	0.00	-0.01	0.04	0.06	0.03	-0.10	0.08	-0.05	0.09
a4	0.03	-0.06	-0.03	0.02	0.03	0.05	0.04	0.04	0.00	-0.11	0.00	-0.02	0.12	-0.18	0.00	0.04
a5	-0.01	0.06	0.07	-0.04	-0.03	0.06	-0.01	0.00	0.00	-0.03	0.05	0.04	-0.05	-0.06	0.01	-0.02
a6	-0.09	-0.10	-0.05	0.00	0.04	0.00	-0.07	-0.03	0.04	0.00	-0.12	-0.03	0.04	0.07	0.02	-0.02
a7	-0.07	-0.06	0.00	0.00	-0.02	-0.09	0.10	-0.09	0.00	0.10	-0.11	-0.01	0.08	-0.04	0.13	0.01
a8	0.04	0.04	-0.05	0.02	0.02	0.09	0.03	-0.09	-0.05	0.01	-0.05	0.03	0.04	0.03	-0.11	0.00
a9	-0.02	-0.06	0.02	0.02	-0.02	-0.09	-0.07	0.07	0.03	-0.11	-0.07	0.06	-0.11	0.08	0.01	-0.01
a10	-0.05	0.05	0.01	-0.10	0.03	-0.01	0.03	-0.01	-0.07	0.09	0.05	-0.02	-0.03	0.10	-0.11	-0.02
a11	0.05	-0.04	0.09	0.05	0.02	-0.02	-0.02	-0.02	0.06	-0.06	-0.06	0.01	-0.05	-0.03	-0.04	-0.14
a12	0.02	-0.02	-0.03	-0.02	-0.12	0.11	-0.06	0.07	0.00	-0.12	-0.03	0.04	0.01	-0.04	-0.03	0.04
a13	-0.04	-0.01	0.03	-0.04	-0.01	0.03	0.03	0.01	0.08	-0.08	-0.19	-0.09	-0.03	0.00	-0.08	0.03
b1	-0.02	-0.03	-0.02	0.02	-0.03	0.07	-0.03	0.01	0.14	-0.02	0.01	-0.05	0.04	-0.02	0.02	0.02
b2	0.02	0.06	0.04	-0.02	-0.01	-0.06	0.09	-0.03	-0.06	0.01	0.00	-0.07	0.02	0.05	-0.12	-0.04
b3	-0.01	-0.01	-0.07	-0.02	-0.04	0.06	0.02	0.06	-0.01	-0.05	-0.04	0.08	-0.07	-0.05	0.05	-0.05
b4	-0.12	-0.01	-0.03	-0.03	0.04	-0.04	0.04	-0.11	-0.01	-0.06	0.01	-0.04	-0.02	-0.05	0.00	0.09
b5	0.01	-0.01	-0.05	-0.07	-0.06	0.02	-0.03	0.07	0.08	-0.02	-0.03	0.03	-0.03	-0.02	0.02	-0.02
b6	0.05	-0.05	-0.07	0.03	0.14	-0.03	-0.02	0.09	0.06	0.03	0.00	-0.03	0.00	-0.02	-0.01	-0.05
b7	-0.10	-0.06	0.01	0.08	-0.09	0.01	-0.03	-0.03	-0.04	-0.05	-0.05	0.05	0.00	0.01	-0.03	0.02
b8	-0.07	0.02	-0.12	0.03	-0.10	-0.03	0.04	-0.07	-0.03	0.03	0.02	0.01	-0.19	0.02	0.01	0.01
b9	-0.01	0.09	0.11	-0.04	-0.11	0.01	0.07	-0.10	-0.07	0.09	-0.06	0.01	0.07	0.02	-0.01	-0.08
b10	0.01	-0.11	0.04	0.07	0.00	-0.06	0.04	0.03	0.07	-0.02	0.02	-0.12	0.00	-0.02	0.04	-0.09
b11	0.05	0.01	-0.04	0.00	-0.01	-0.08	-0.02	0.00	-0.15	0.04	-0.01	0.12	0.00	0.06	0.03	0.03
b12	-0.13	0.04	-0.10	0.03	-0.01	-0.02	0.01	0.01	0.00	-0.01	0.03	-0.04	0.06	0.01	0.00	0.13
b13	-0.09	-0.05	-0.03	0.01	0.02	-0.12	0.01	-0.03	0.00	-0.02	-0.02	0.01	-0.02	0.03	0.09	-0.01
b14	0.04	-0.07	0.01	0.05	-0.11	0.05	-0.08	-0.06	-0.04	-0.04	-0.08	0.01	-0.03	0.04	-0.07	-0.04
b15	0.03	0.07	0.15	-0.05	0.02	0.00	-0.06	-0.06	-0.04	0.08	0.04	-0.03	0.03	-0.01	-0.02	0.04
b16	-0.06	0.10	-0.03	0.04	-0.08	-0.05	0.12	-0.12	-0.01	-0.04	-0.03	-0.03	-0.06	0.03	-0.04	-0.04
b17	-0.08	-0.04	-0.09	0.02	0.03	0.08	-0.13	0.07	0.05	0.04	0.04	0.01	0.07	-0.09	0.05	-0.02
b18	-0.05	0.02	0.01	-0.01	0.00	0.03	0.04	-0.02	-0.01	-0.08	-0.01	-0.05	-0.05	0.02	0.02	-0.06
b19	-0.41	-0.03	-0.02	0.03	-0.01	-0.07	-0.04	-0.03	-0.02	0.02	-0.06	0.03	0.01	-0.06	0.04	0.03
b20	0.95	-0.04	0.03	0.07	-0.18	0.09	-0.03	0.02	0.02	-0.02	0.04	0.00	-0.07	-0.03	-0.08	-0.02
c1	-0.04	0.92	-0.05	-0.03	0.02	0.04	0.08	-0.45	-0.14	-0.01	0.00	0.09	-0.02	-0.03	-0.04	0.03
c2	0.03	-0.05	0.95	-0.26	-0.14	0.06	-0.05	0.03	0.03	-0.02	-0.09	-0.26	-0.09	-0.12	-0.11	0.04
c3	0.07	-0.03	-0.26	0.94	-0.19	0.03	-0.09	0.00	-0.05	-0.04	-0.04	0.01	-0.10	-0.04	-0.05	0.05
c4	-0.18	0.02	-0.14	-0.19	0.95	-0.16	-0.05	0.06	0.02	0.04	0.00	0.01	0.03	0.02	-0.03	0.05
c5	0.09	0.04	0.06	0.03	-0.16	0.88	-0.14	0.00	0.07	-0.65	0.00	0.16	0.03	-0.15	-0.07	-0.12
c6	-0.03	0.08	-0.05	-0.09	-0.05	-0.14	0.95	-0.05	-0.13	0.04	-0.07	-0.25	0.03	0.02	0.03	-0.11
c7	0.02	-0.45	0.03	0.00	0.06	0.00	-0.05	0.94	-0.03	-0.17	0.02	-0.05	0.04	-0.18	-0.06	0.02
c8	0.02	-0.14	0.03	-0.05	0.02	0.07	-0.13	-0.03	0.94	-0.08	-0.07	-0.10	0.11	-0.14	0.09	-0.23
c9	-0.02	-0.01	-0.02	-0.04	0.04	-0.65	0.04	-0.17	-0.08	0.89	0.03	-0.07	-0.01	0.17	-0.06	0.04
c10	0.04	0.00	-0.09	-0.04	0.00	0.00	-0.07	0.02	-0.07	0.03	0.97	-0.10	-0.01	0.04	-0.05	-0.14
c11	0.00	0.09	-0.26	0.01	0.01	0.16	-0.25	-0.05	-0.10	-0.07	-0.10	0.94	-0.26	0.03	-0.01	-0.19
c12	-0.07	-0.02	-0.09	-0.10	0.03	0.03	0.03	0.04	0.11	-0.01	-0.01	-0.26	0.93	-0.43	0.03	-0.05
c13	-0.03	-0.03	-0.12	-0.04	0.02	-0.15	0.02	-0.18	-0.14	0.17	0.04	0.03	-0.43	0.94	-0.04	-0.12
c14	-0.08	-0.04	-0.11	-0.05	-0.03	-0.07	0.03	-0.06	0.09	-0.06	-0.05	-0.01	0.03	-0.04	0.96	-0.11
c15	-0.02	0.03	0.04	0.05	0.05	-0.12	-0.11	0.02	-0.23	0.04	-0.14	-0.19	-0.05	-0.12	-0.11	0.95

Appendix 5: Factor Extraction Table

Table 21A: Eigenvalues and the Explained Percentage of Variance by the Factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.21	31.68	31.68	15.21	31.68	31.68
2	2.48	5.17	36.86	2.48	5.17	36.86
3	2.22	4.62	41.48	2.22	4.62	41.48
4	1.80	3.75	45.23	1.80	3.75	45.23
5	1.71	3.57	48.79	1.71	3.57	48.79
6	1.34	2.78	51.58	1.34	2.78	51.58
7	1.29	2.68	54.26	1.29	2.68	54.26
8	1.27	2.64	56.90	1.27	2.64	56.90
9	1.14	2.38	59.28	1.14	2.38	59.28
10	1.09	2.27	61.55	1.09	2.27	61.55
11	1.03	2.14	63.70	1.03	2.14	63.70
12	0.94	1.95	65.65			
13	0.90	1.88	67.53			
14	0.84	1.74	69.27			
15	0.79	1.64	70.92			
16	0.78	1.62	72.53			
17	0.72	1.50	74.03			
18	0.72	1.49	75.52			
19	0.67	1.39	76.91			
20	0.65	1.35	78.26			
21	0.62	1.29	79.55			
22	0.60	1.24	80.79			
23	0.56	1.17	81.96			
24	0.54	1.12	83.09			
25	0.54	1.12	84.20			
26	0.52	1.08	85.28			
27	0.50	1.03	86.32			
28	0.48	1.00	87.32			
29	0.46	0.96	88.28			
30	0.43	0.90	89.18			
31	0.41	0.86	90.05			
32	0.40	0.84	90.89			
33	0.38	0.79	91.68			
34	0.37	0.78	92.45			
35	0.35	0.73	93.18			
36	0.34	0.71	93.89			
37	0.33	0.68	94.57			
38	0.31	0.65	95.22			
39	0.31	0.64	95.86			
40	0.29	0.61	96.48			
41	0.28	0.59	97.06			
42	0.27	0.56	97.62			
43	0.24	0.51	98.13			
44	0.22	0.47	98.59			
45	0.20	0.41	99.00			
46	0.18	0.37	99.37			
47	0.16	0.32	99.69			
48	0.15	0.31	100.00			

Appendix 6: Rotated Factor Tables

Table 22A: Rotated Component Matrices with Varimax Rotation

	Component										
	1	2	3	4	5	6	7	8	9	10	11
a5	0.81										
a3	0.77										
a6	0.64										
a8	0.62										
a1	0.56										0.36
a11	0.55										0.38
a12	0.51										
a2	0.41							0.40			
c3		0.72									
c2		0.69									
c12		0.64									
c4		0.56									
c13		0.54				0.32			0.42		
b5		0.43			0.41						
b15			0.83								
b3			0.72								
b13			0.71								
b16			0.60								
c9				0.78							
c5				0.73	0.33						
a9				0.73							
a4	0.34			0.63							
c14				0.36							
b11					0.78						
b10					0.77						
b12					0.64						
c15						0.69					
c8						0.61			0.35		
c11		0.47				0.59					
c6		0.33				0.59					
c10						0.49				0.43	
b6							0.63				
b7							0.63				
b14						0.31	0.62				
b8		0.46					0.49				
b9			0.40				0.47				
b1								0.68			
b18								0.56			
b2					0.42			0.50			
b17			0.45					0.49			
c1									0.73		
c7									0.69		
b4		0.33							0.37		
a13										0.78	
a7										0.74	
a10											0.70
b19								0.37			0.56
b20		0.32	0.32					0.30			0.49

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 9 iterations.

Table 23A: Pattern Matrix with Oblique Rotation

	Component										
	1	2	3	4	5	6	7	8	9	10	11
b6	0.65										
b7	0.63										
b14	0.62										
b9	0.43					-0.33					
b8	0.42										0.38
a5		0.82									
a3		0.79									
a8		0.59									
a6		0.59									
a1		0.53								-0.35	
a11		0.46								-0.35	
a12		0.45									
b11			0.78								
b10			0.78								
b12			0.61								
b1				-0.65							
b18				-0.51							
b2			0.38	-0.46							
b17				-0.44		-0.42					
a2		0.34		-0.36							
c9					0.77						
c5					0.73						
a9					0.73						
a4					0.61						
c14					0.32						
b15						-0.84					
b3						-0.74					
b13						-0.71					
b16						-0.58					
a13							0.80				
a7							0.75				
c15								-0.64			
c8								-0.58	-0.33		
c6								-0.56			
c11								-0.54			0.37
c10							0.42	-0.42			
c1									-0.77		
c7									-0.70		
b4									-0.36		
a10										-0.72	
b19										-0.59	
b20										-0.50	
c3											0.74
c2											0.63
c12											0.57
c4											0.54
c13									-0.43		0.45
b5			0.36								0.37

Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.

a Rotation converged in 22 iterations.

Appendix 7: Questionnaire Items with Oblique Rotation

Table 24A: Oblique Pattern Matrix Rotation with Variables

		Component										
		1	2	3	4	5	6	7	8	9	10	11
b6	Big Screen	0.65										
b7	Sound Systems	0.63										
b14	Scoreboards	0.62										
b9	Stadium Shelter	0.43					-0.33					
b8	Stadium Design	0.42										0.38
a5	Courteousness of Security		0.82									
a3	Helpfulness of Security		0.79									
a8	Knowledge of Security		0.59									
a6	Security Help with Seating		0.59									
a1	Security Control of Disorderly Behaviour		0.53								-0.35	
a11	Presence of Security		0.46								-0.35	
a12	Courteousness of Ticket Collectors		0.45									
b11	Spaciousness of Seating			0.78								
b10	Comfort of Seating			0.78								
b12	Access to Seating			0.61								
b1	Cleanliness of Stadium				-0.65							
b18	Cleanliness of Toilets				-0.51							
b2	Access to Amenities			0.38	-0.46							
b17	Safe Access to and from Stadium				-0.44		-0.42					
a2	Efficiency of Ticket Collection		0.34		-0.36							
c9	Quality of Food and Drinks					0.77						
c5	Range of Food and Drinks					0.73						
a9	Efficiency of F&B Workers					0.73						
a4	Speed of F&B Workers					0.61						
c14	Match Programs					0.32						
b15	Closeness of Car Parking						-0.84					
b3	Reliability of Car Parking						-0.74					
b13	Security of Car Parking						-0.71					
b16	Transportation Options						-0.58					
a13	Player Acknowledgement							0.80				
a7	Player Interaction							0.75				
c15	Flow of Game								-0.64			
c8	Fairness of Officials								-0.58	-0.33		
c6	Number of Tries per Game								-0.56			
c11	Speed of the Game								-0.54			0.37
c10	Sportsmanship of Players							0.42	-0.42			
c1	Pre-Game Entertainment									-0.77		
c7	Half-Time Entertainment									-0.70		
b4	Visual Appeal of Facilities									-0.36		
a10	Enforcement of Non-Smoking Policies										-0.72	
b19	Impact of other Spectators										-0.59	
b20	Interaction with other Spectators										-0.50	
c3	Performance of Team											0.74
c2	Exciting Games											0.63
c12	Exciting Atmosphere											0.57
c4	Socialisation											0.54
c13	Total Entertainment									-0.43		0.45
b5	View of Game			0.36								0.37

Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.

a Rotation converged in 22 iterations.

Table 30A: Pearson Correlation Matrix, Model 7

Correlations

		Recommend	satisfaction	Fanship
Recommend	Pearson Correlation	1	.543**	.384**
	Sig. (2-tailed)		.000	.000
	N	462	462	462
satisfaction	Pearson Correlation	.543**	1	.303**
	Sig. (2-tailed)	.000		.000
	N	462	462	462
Fanship	Pearson Correlation	.384**	.303**	1
	Sig. (2-tailed)	.000	.000	
	N	462	462	462

**. Correlation is significant at the 0.01 level (2-tailed).

Table 31A: Pearson Correlation Matrix, Model 8

Correlations

		Attend	satisfaction	Fanship
Attend	Pearson Correlation	1	.310**	.324**
	Sig. (2-tailed)		.000	.000
	N	462	462	462
satisfaction	Pearson Correlation	.310**	1	.303**
	Sig. (2-tailed)	.000		.000
	N	462	462	462
Fanship	Pearson Correlation	.324**	.303**	1
	Sig. (2-tailed)	.000	.000	
	N	462	462	462

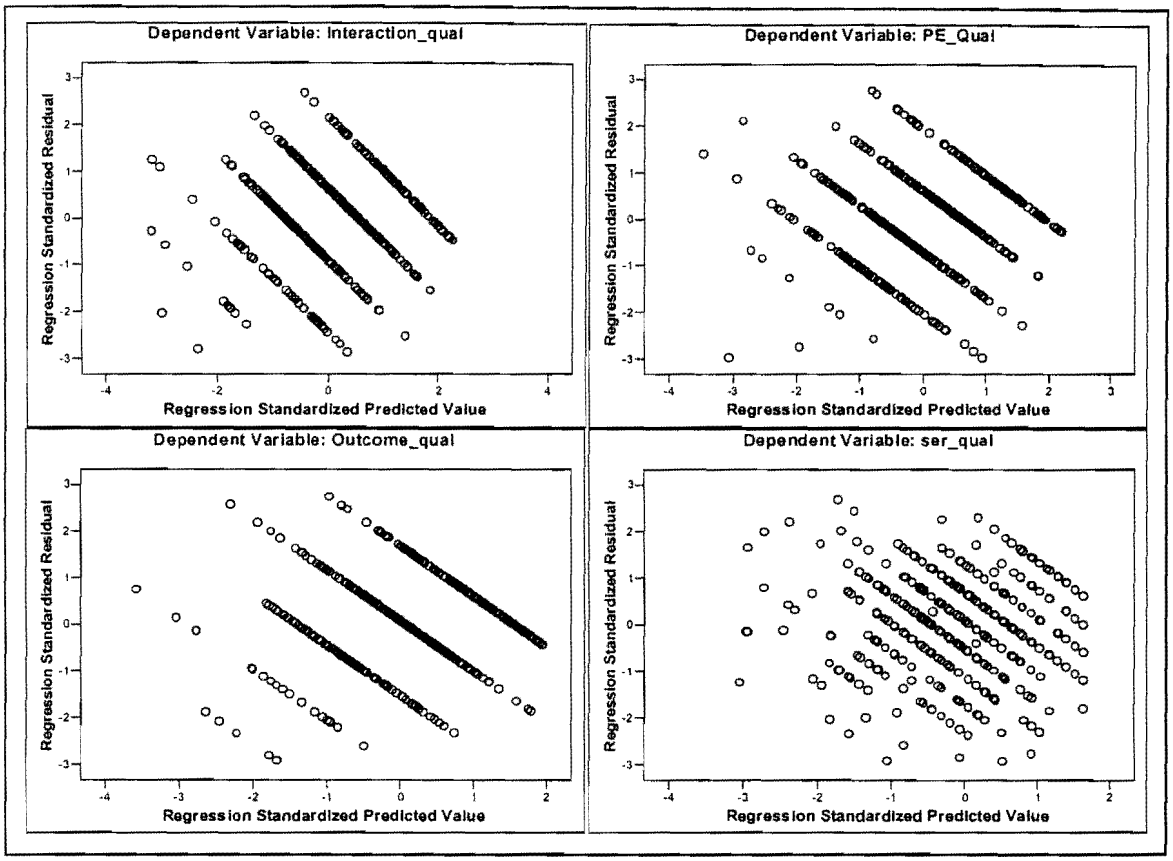
**. Correlation is significant at the 0.01 level (2-tailed).

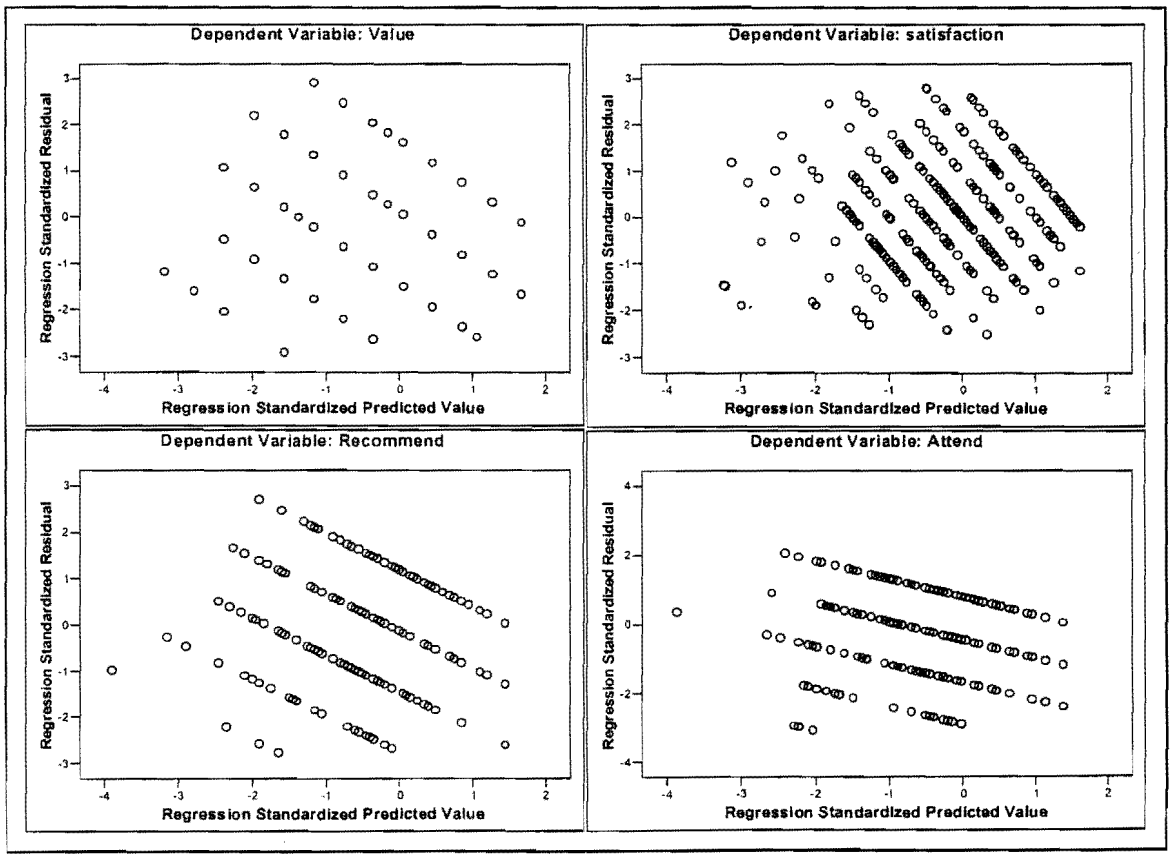
Table 32A: Multicollinearity Statistics

	Tolerance	VIF	Condition Index
Multiple Regression Model 1: Interaction Quality			
Security Employees	0.68	1.48	10.23
Food and Beverage	0.75	1.33	11.64
Social Factors	0.77	1.30	14.56
Players	0.86	1.16	18.95
Multiple Regression Model 2: Physical Env Quality			
Social Factors	0.65	1.54	9.80
Visuals and Sound	0.71	1.41	12.41
Access	0.64	1.56	15.54
Seating	0.59	1.70	16.93
Cleanliness	0.57	1.77	23.58
Multiple Regression Model 3: Outcome Quality			
Atmosphere	0.60	1.67	10.22
Game Quality	0.59	1.70	12.00
Entertainment	0.67	1.48	21.48
Food and Beverage	0.70	1.44	27.75
Multiple Regression Model 4: Service Quality			
Interaction Quality	0.73	1.36	8.62
Physical Env Quality	0.61	1.63	14.50
Outcome Quality	0.59	1.68	17.96
Fanship	0.94	1.07	20.30
Multiple Regression Model 6: Satisfaction			
Service Quality	0.55	1.80	8.40
Fanship	0.92	1.09	15.68
Value	0.58	1.72	22.10
Multiple Regression Model 7: Recommend Service			
Satisfaction	0.91	1.10	7.86
Fanship	0.91	1.10	19.10
Multiple Regression Model 8: Future Attendance			
Satisfaction	0.91	1.10	7.90
Fanship	0.91	1.10	19.29

Appendix 9: Scatter Plots

Figure 3A: Residual Scatter Plots





Appendix 10: Normality Plots

Figure 4A: Histograms of Residuals with Normal Curve